CHAPTER-II
REVIEW OF RELATED LITERATURE

The study of related literature in research is of immense significance because it stimulates and encourages the investigators to go deep into various aspects of the problem-in-hand with the ideas and thoughts of eminent researchers and scholars in mind. Review of literature, reports of relevant researches, studies of pertinent pages out of comprehensive books on the subject, study of published articles and going through manuscripts related to the problem under investigation is of great help to analyze previous studies hypotheses, methodology, results, educational implications and suggestions for further research. It helps investigator to build and designed his study. It provides a rationale for the conduct of a new research study. Review of literature also helps the investigator to interpret the significance of one's findings. So for the present study the investigator reviewed the books and journals printed as well as online, dissertation, abstracts, reference books, surveys of educational research, research studies of different researchers and institutions, newspapers, magazines, publications of National Council of Teacher Education, NCERT, NUEPA, Govt. of Punjab, MHRD, Govt. of India and related websites etc. The research on cooperative efforts has unusual breath; it has focused on a wide variety of diverse outcomes. Over the past 100 years researchers have focused on such diverse outcomes as achievement, interpersonal attraction, social competencies, internalization of values, social support, friendships, higher-level reasoning, retention, time on task, achievement motivation, intrinsic motivation, continuing motivation, moral reasoning, perspective-taking, reduction of stereotypes and prejudice, valuing differences, social and cognitive development, psychological health, self-esteem, the quality of the learning environment, and many other outcomes. There may be no other instructional strategy that simultaneously achieves such diverse outcomes.

The diverse and positive outcomes that simultaneously result from cooperative efforts have sparked numerous research studies on cooperative learning. Cooperative learning is the instructional method of choice on foreign soil. Another factor
contributing to the widespread use of cooperative learning is the variety of cooperative learning methods available for teacher use, ranging from very concrete and prescribed to very conceptual and flexible. Review of literature for present study is given under the following headings:

2.1 : Review of literature related to Critical Thinking
2.1.1: Review of literature related to cooperative learning and Critical Thinking
2.1.2: Summary of reviews related to Critical Thinking

2.2 : Review of literature related to Social Competence
2.2.1: Review of literature related to cooperative learning and Social Competence
2.2.2: Review of literature related to Jigsaw and Social Competence
2.2.3: Summary of reviews related to Social Competence

2.3 : Review of literature related to Achievement
2.3.1: Review of literature related to cooperative learning and Achievement
2.3.2: Review of literature related to jigsaw and Achievement
2.3.3: Summary of reviews related to Achievement

2.1 REVIEW OF LITERATURE RELATED TO CRITICAL THINKING

Ennis et al. (1964) designed Cornell Critical Thinking Test (CCTT) Level X. This test includes the following skills: Induction, Deduction, Credibility, and Identification of Assumptions. It includes 6 sample questions, then 72 others. Test taker should work as quickly as they can, but do not rush because this is not a speed test. Tests may be administered as 50-minute timed or as untimed evaluations. The reliability coefficient of the CCTT Level X ranges from .67 to .90 when administered to 280 undergraduates.

Baseda (1983) studied “Level of questioning and other class participative mode and its effect on Pupil Achievement and critical thinking ability” and found significant relationship between training conditions and use of various participative mode of teaching on pupil achievement and critical thinking ability.

Ennis and Weir (1985) developed Ennis-Weir test which is general test of critical thinking ability in the context of argumentation. It is an essay type test. It takes the
form of a letter to the editor of fictional newspaper. In the letter, the writer makes a proposal and offers a variety of arguments in support of it. Each argument appears in a separate numbered paragraph. There are eight paragraphs in all; each paragraph exemplifies at least one of the errors or types of reasoning listed in the previous sections. Two of the paragraphs give probable support to the writer’s proposal. Examinee read the letter and then write an essay evaluating the argument of each paragraph and the letter as a whole. The Ennis-Weir is most appropriate for use with high school and college students however it is also recommended for sixth grade school students. Inter rater reliabilities .86 and .82 was obtained by administering essay test written by 27 student’s midway through a college level introductory informal logic course and 28 gifted eighth-grade students of English were graded by two different graders. These are high correlations for an essay test. The test takes about 40 minutes- 10 minutes to read and think about the letter and 30 minutes to write 9 paragraphs evaluating the argument of the letter.

Baxter-Magolda (1992) has concluded from her research that gender differences in students’ reasoning patterns and ways they justify their thoughts are fluid, a continuum with numerous variations and combinations rather that a dichotomy between female and male students. No single reasoning pattern was used exclusively by women or men, nor did students, male or female, limit themselves to one reasoning pattern over time or between different domains. Further, she has found more similarities than differences in men’s and women’s ways of knowing, and she has also determined that different reasoning patterns led to equally complex ways of viewing the world.

Kuhn (1992) has concluded that argumentive reasoning ability does not differ systematically as a function of sex. No evidence from her investigation has suggested that one sex is any more disposed or competent to engage in argumentative thinking than the other.

Facione et al. (1994) developed The California Critical Thinking Disposition Inventory (CCTDI) which uses the Delphi Report's consensus definition of critical thinking as the theoretical basis to measure critical thinking disposition. Item analysis and factor analysis techniques were used to create seven disposition scales, which
grouped the Delphi dispositional descriptions into larger, more unified constructs: open-mindedness, analyticity, cognitive maturity, truth-seeking, systematicity, inquisitiveness, and self-confidence. Cronbach's alpha for the overall instrument, the disposition toward critical thinking, is .92. The 75-item instrument was administered to an additional sample of college students (N = 1019). The alpha levels in the second sample remained relatively stable, ranging from .60 to .78 on the subscales and .90 overall. The instrument has subsequently been used to assess critical thinking disposition in high school through the graduate level but is targeted primarily for the college undergraduates. Administration time is 20 minutes. Correlation with its companion instrument, the California Critical Thinking Skills Test, also based on the Delphi critical thinking construct, was measured at .66 and .67 in two pilot sample groups.

**Giancarlo and Facione (1994)** in a study of the critical thinking disposition and skill of Spanish and English speaking students at Camelback High Schools found a significant positive correlation of $r = .41$ between scores of critical thinking dispositions and critical thinking skills. This correlation between overall critical thinking skill and overall critical thinking dispositions suggests that up to 16.8% of the variance in critical thinking skills test scores is potentially attributable to the differences in students’ critical thinking dispositions scores.

**King and Kitchener’s (1994)** in their findings on the Reflective Judgment Model reported somewhat mixed results in context to gender difference in critical thinking. Of the 17 studies reviewed, 6 indicated that males scored higher on the Reflective Judgment Instrument and the rest reported no difference. King and Kitchener have suggested that reported differences may be due to a variety of factors in addition to gender, including differences in academic aptitude or rates of maturation.

**Denney (1995)** investigated age, gender, and education differences in critical thinking during the adult years. The Watson-Glaser Critical Thinking Appraisal was administered to 60 men and women between the ages of 20 and 79. Regression analyses indicated that age was significantly related to overall critical thinking: performance decreased with increasing age. Education was also significantly related to critical thinking: performance increased with increasing education. However, an interaction between age and education in the analysis of total critical thinking scores
indicated that education was significantly related to critical thinking only in the later adult years. No gender differences were found in critical thinking performance. 

**Gokhale (1995)** studied that the active exchange of ideas within small groups not only increases interest among the participants but also promotes critical thinking. After conducting a statistical analysis on the test scores, it was found that students who participated in collaborative learning had performed significantly better on the critical-thinking test than students who studied individually. It was also found that both groups did equally well on the drill- and-practice test. This result is in agreement with the learning theories proposed by proponents of collaborative learning. 

**Elder (1996)** published an article in *Inquiry: Critical Thinking Across the Disciplines* that stated that if we are concerned with developing our rationality in order to improve our lives, we must understand the powerful role that both emotions and thoughts play in our minds. We must understand the ways in which affect and cognition influence one another in determining both our outlook on life and our behavior. Most importantly, we must come to terms with those truths about the human mind that enable us to begin the process of taking charge of our minds: that thoughts and emotions are inextricably bound, that we have both egocentric and rational tendencies, that our inner conflicts are never best understood as a simple matter between emotion and reason, that self-command of mind takes both extended education and self-discipline, that our fullest rational development is dependent on the development of rational affect, that to bring intelligence to bear upon emotions we must take charge of the thinking underlying those emotions. 

**Elliott (1996)** published an article that offers practical active learning strategies for promoting critical thinking in large classroom instruction. Although nurse educators have designed many techniques for enhancing critical-thinking skills in clinical and seminar settings, lectures also remain an integral part of nursing education for enhancing CT skills to some extent. 

**Howenstein (1996)** assessed the critical thinking ability of a sample of 160 nurses from two urban hospitals. They hypothesized four variables to be associated with critical thinking ability, namely, age, level of education, years of nursing experience, and area of expertise in nursing. Critical thinking was assessed using the WGCTA.
Findings of their study suggest that age and years of experience were negatively correlated with critical thinking ability, and the level of education was positively related to critical thinking.

**Robinson (1996)** published a paper that attempts to re-establish the importance of critical thinking and how Valencia Community College's (Florida) critical thinking competency can be developed using several teaching models. Critical thinking skills have to be learned and fine-tuned with the assistance and guidance of an external entity. Competency I of a Valencia Community College graduate states that each graduate should be able to "think critically and make reasoned choices by acquiring, analyzing, synthesizing, and evaluating knowledge." Nine Valencia sub-competencies that can be used in the process of assessing and measuring critical thinking, include: (1) know what to observe and systematically make accurate observations; (2) represent observations in an appropriate pattern to show relationships; (3) recognize problems that need to be and can be solved; (4) use sequential and holistic approaches to problem solving; and (5) analyze information and ideas to make decisions. Some models of teaching that fit easily into the critical thinking competency are concept attainment, scientific inquiry, inquiry training, simulation, role playing, thinking inductively, advanced organizer, and synetics.

**Claytor (1997)** found gender to be independent of critical thinking skills. However, other studies have found a significant relationship between gender and critical thinking skills (Rudd et al., 2000; Walsh, 1996; Wilson, 1989). In these studies, the findings were interpreted as females having higher levels of critical thinking skills than males. To summarize the currently inconclusive literature regarding the relationship between gender and critical thinking, research suggests that either females tend to have higher levels of critical thinking, or gender has no relationship with critical thinking. Gender differences to critical thinking and its component constructs remains a topic of controversy among scholars. Research findings have not yet resolved this issue.

**Facione and Facione (1997)** conducted a five-year longitudinal investigation of 7,926 students from 50 different college programs to explore the relationships between critical thinking skill and critical thinking disposition. Among different populations in the data, low positive correlations were found between total critical
thinking skill and total critical thinking disposition, suggesting a relationship. However, not all scales of critical thinking skills were significantly correlated with scales of critical thinking disposition.

**Facione (1998)** summarized key findings in the literature and determined that a significant, but relatively low relationship existed between critical thinking skills and dispositions. Facione concluded that instruction incorporating critical thinking must include fostering the motivation to think as well as developing critical thinking skills. That is, a critical thinking instructional model must include facilitating both critical thinking skills and dispositions.

**Reed (1998)** conducted a study in which he investigated the effect of integrating Richard Paul's model for critical thinking into a U.S. history course on community college students' 1) abilities to think critically about U.S. history and about everyday issues, 2) dispositions toward thinking critically, and 3) knowledge of history content. This study also examined if age (under 22, 22 and older) or gender moderated the effectiveness of the instructional method. Four sections of U.S. History, 1877 to the Present, participated in this one-semester study. Two sections were randomly selected to serve as the experimental group and the other two sections served as the control group. The experimental group (n = 29) received approximately 90 minutes of explicit instruction distributed over the semester in using Paul's model for critical thinking to analyze and interpret primary source documents. In addition, the model was integrated into a series of assigned classroom activities. The control group (n = 23) was taught in a more traditional manner. Students took three pretests and four post tests to measure the effectiveness of the instructional model: a Documents Based Question (DBQ) from an Advanced Placement Examination, the Ennis-Weir Critical Thinking Essay Test, the California Critical Thinking Dispositions Inventory (CCTDI), and a History Content Exam. The primary statistical analyses were done with 2 (group) x 2 (age) x 2 (gender) ANCOVAs using pretests as covariates. The experimental group scored significantly higher on the DBQ, p = .004, and on the Ennis-Weir, p = .0001. Effect sizes (Cohen's f) were DBQ = .48 and Ennis-Weir = .83. Statistical tests did not indicate significant differences on the CCTDI or on the History Content Exam. No significant differences were found in the effectiveness of the method of instruction by age or gender. Three major findings emerged from this
study: 1) community college students’ abilities to think historically and to think critically improved in a single course; 2) community college students’ end of term knowledge of history content did not suffer when training in critical thinking abilities was integrated into course material; 3) age and gender did not play significant roles in developing college students’ critical thinking abilities.

Bailin et al. (1999) presented a paper in which they analysed three widely-held conceptions of critical thinking, as one or more skills, as mental processes, and as sets of procedures. According to them, some who write about critical thinking seem to muddle all three views. Apart from the errors or inadequacies of the conceptions themselves, they promote misconceived practices for teaching critical thinking. Together, they have led to the view that critical thinking can be taught effectively by infusing it within any curricular practice in which students are involved.

Meghani (1999) carried out a study of the effectiveness of teaching learning strategy for developing critical thinking in students of class XI using Psychology subject as content. The Objectives of the study were: 1. to evolve a strategy for teaching-learning critical thinking in students of Class XI using the subject Psychology as content. 2. To develop a tool for measuring critical thinking in students of Class XI. 3. To find the effectiveness of the evolved strategy for teaching-learning critical thinking. The sample of the study comprised of English medium students of Class XI, who had opted for Art Stream and had Psychology as one of their subjects. The content to be taught was restructured into lesson plans using techniques and methods aimed at enhancing critical thinking in students. Plus, Minus and Interesting (PMI), Other People’s Point of View (OPV), and Consider All Factors (CAF) are some of the techniques used from de Bono Co. RT Lessons. Methods used for infusing critical thinking are case study and Socratic Questioning. A tool measuring critical thinking in students (prepared by the investigator) was implemented before and after intervention programmes. In order to find out the effectiveness of the evolved strategy for teaching learning critical thinking qualitative and quantitative analysis was done. For quantitative analysis ‘single group t test’ was employed. The results of the t-test showed that the evolved strategy for teaching learning critical thinking had been effective in developing critical thinking in students with regard to ability to think
independently through logical reasoning and justification, evaluate
arguments/beliefs/opinion using PMI technique, compare and contrast analogies using
CAF technique, think dialectically and reflectively, apply knowledge in a new
situation, show improvement in questioning skill and critical reading skills, imbibe
affective dimensions of critical thinking like intellectual autonomy,
intellectual empathy, intellectual courage and intellectual humility.

Facione (2000) in his book The Disposition toward Critical Thinking: Its Character,
Measurement, and Relationship to Critical Thinking Skill studied that skill in critical
thinking is positively correlated with the consistent internal motivation to think and
that specific critical thinking skills are matched with specific critical thinking
dispositions.

Scheffer and Rubenfeld (2000) conducted a study to define critical thinking in
nursing. A Delphi technique with 5 rounds of input was used to achieve this purpose.
An international panel of expert nurses from nine countries: Brazil, Canada, England,
Iceland, Japan, Korea, Netherlands, Thailand, and 23 states in the U.S. participated in
this study between 1995 and 1998. A consensus definition (statement) of critical
thinking in nursing was achieved. The panel also identified and defined 10 habits of
the mind (affective components) and 7 skills (cognitive components) of critical
thinking in nursing. The habits of the mind of critical thinking in nursing included:
confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual
integrity, intuition, open-mindedness, perseverance, and reflection. Skills of critical
thinking in nursing included: analyzing, applying standards, discriminating,
information seeking, logical reasoning, predicting and transforming knowledge.

Smitha and Rao (2000) studied a sample of 84 secondary school students and found
that Guided Discovery Learning is more effective than conventional teaching in
developing Critical Thinking of Secondary School Students. The F value came out to
be 102.943, hence null hypothesis stating that there is no significant relationship
between the critical thinking of students who are taught through Guided Discovery
Learning and the students in control group is rejected.

Brahler et al. (2002) studied the online learning modules (OLM) on higher-order
critical thinking skills in students enrolled in an upper-division Exercise Testing and
Prescription course. The OLM provided students with an online learning environment in which to review clinical physiological details from authentic patient case data and develop exercise prescriptions (ExRx), by requiring students to critically analyze authentic patient case histories and collaborate on computer-based learning activities. On the basis of assessment data, it was concluded that the Open Learning Module helped exercise science students develop the critical thinking skills necessary for development of effective exercise prescriptions by requiring them to think critically while concurrently reinforcing lecture-presented exercise science content.

Simpson and Courtney (2002) conducted a study in which they gave a literature review in which they reported a history of inquiry into critical thinking and research to support the conclusion that critical thinking is necessary not only in the clinical practice setting, but also as an integral component of nursing-education programmes to promote the development of nurses' critical-thinking abilities.

Alpay et al. (2003) conducted a study to identify the impact of several important factors on the development of critical thinking ability in adolescents. Along with the variables such as age, gender, school performance used in earlier studies in the literature, it was hypothesized that parental attitude towards children, education of parents and income of the family are associated with critical thinking ability. Watson-Glaser Scale of Critical Thinking Appraisal and Parental Attitude Appraisal were administered to 1026 Turkish students (age range 12—22) at different education stages. It is determined that critical thinking ability is positively related to "liberal" attitude of mothers. The higher the education level of fathers, the better developed will be the critical thinking ability of the adolescents. Critical thinking ability is also shown to be affected by school performance, income of the family and age. The impact of gender was not statistically significant.

Eichhorn (2003) reported in an article that the Army Management Staff College (AMSC) has included critical thinking in its curriculum overtly since January of 1991. Since then, it has moved from teaching "about" critical thinking to progressively embedding critical thinking into the learning process throughout the curriculum. The ultimate goal is for an AMSC student to become deeply immersed in critical thinking throughout the College curriculum, internalize it as the curriculum proceeds, and to return with that habit of thinking so firmly established that it becomes normal.
Lee (2004) examined the effects of individual versus online collaborative case study learning on the development of critical thinking skills in undergraduate students. Case study learning was integrated into EDP 1350: Effective Learning, an undergraduate course designed to improve students' potential for academic success. A technology readiness survey was administered to participants prior to the case study learning to assess their readiness to participate in the online component of the learning. Case studies related to self-regulation of behavior, motivation, and cognition for academic tasks were used as stimulus prompts. Facione and Facione's (1996) holistic critical thinking rubric was used to measure the change in participants' critical thinking over the completion of the case study learning analyses. A nonequivalent (pretest and posttest) control-group design was used to obtain statistical, quantitative results from the sample of eighty undergraduate students, and a process satisfaction questionnaire was used to survey students' satisfaction with various aspects of the case study learning analyses. Between-group repeated measures analysis detected no significant mean differences in critical thinking between the treatment group (online collaborative discussion) and the comparison group (traditional individual assignment) as measured by the holistic critical thinking scoring rubric. Repeated measures within-group analysis showed significant gains in critical thinking within both the treatment and comparison groups. A between-group technology readiness survey analysis showed no significant differences in technology readiness between the groups, and a between-groups process satisfaction questionnaire analysis showed no significant differences in process satisfaction between the groups. Overall, participants in both groups reported feeling satisfied with the case study learning analyses.

Lampert (2005) conducted a study that investigated the variance in critical thinking dispositions between arts and non-arts undergraduates. A consensus of findings in research literature on education and critical thinking indicates that an inquiry-based curriculum positively influences gains in critical thinking. Research shows, as well, that learning in the arts is largely inquiry-based. The synthesis of those findings and the results of this study indicate that exposure to learning in the arts positively influences students' disposition to think critically. The study reported in this article utilized quantitative data from the California Critical Thinking Disposition Inventory (CCTDI), a survey instrument. Data were collected from a sample of 141
undergraduates at a large, urban, public university on the U.S. east coast. The sample consisted of two discipline groups: arts and non-arts undergraduates; and two class rank groups; freshmen and juniors/seniors. As would be expected, when the class rank groups were compared, the juniors/seniors showed a significantly higher mean overall score on the CCTDI and were also found to have significantly higher scores on several of the subscales. Comparison of the two discipline groups showed no significant difference in overall mean CCTDI scores between arts and non-arts students, but the arts students were found to have significantly higher mean scores on several of the subscales within the research instrument: truth-seeking, maturity, and open-mindedness.

**Malhotra (2006)** conducted an experimental study to investigate impact of quality instruction with home based remediation and parental involvement on life skills of 5th graders. She has taken sample of 160 students (boys and girls) of class 5th from a public school of Solan. After the treatment collected data were analysed by employing 2*3 factorial design, it was found that quality instruction with home based remediation result in higher scores of all selected life skills as compare quality instruction without home based remediation.

**Tabrizi (2006)** studied the relationship between critical thinking and language proficiency on 77 students using Ex post facto and found out that there is significant relationship between levels of language proficiency and their proficiency in Persian CT Test.

**Kong (2007)** conducted a study that examined the effects of the Cognitive-Infusion Intervention on critical thinking skills and dispositions of the pre-service teachers in Singapore. Quasi-experimental 2 x 2 factorial pre test-post test design was employed. The two factors are treatment condition [experimental vs. control], and education programme grouping [Post Graduate Diploma in Education (PGDE) vs. Diploma in Education (DipEd)]. The study aims to find out whether there will be any improvement in their critical thinking skills (measured by Watson-Glaser Critical Thinking Appraisal: Watson and Glaser, 1980), and critical thinking dispositions (measured by California Critical Thinking Dispositions Inventory: Facione et al., 2000). Results show that participants who have gone through the Cognitive-Infusion Module (CIM) scored significantly higher (p<.05) in the overall critical thinking skills
and the sub-skills of ‘inference’, ‘deduction’ and ‘recognition of assumptions’. The PGDE experimental group also scored significantly higher in the overall critical thinking dispositions (p<.05) as well as the dispositions of ‘analyticity’ (p<.01) and ‘inquisitiveness’ (p<.01). 136 pre-service teachers reading PGDE (N=27) and DipEd (N=109) took part in this study.

Ortiz (2007) investigated the assumption that studying philosophy improves critical thinking found that although it marginally improves CT skills; it is not the most effective way to do it. They conducted study on three groups. In first group they referred to the CT gain for those students taking traditional CT offered by philosophy departments. This means CT teaching using lectures and discussion, but excluding argument mapping instruction. The analysis of the results for this Group yielded a value of 0.34 SD, CI [0.21, 0.48]. CT with some argument mapping: The CT gain for those students taking CT courses teaching some argument mapping is 0.68 S.D., CI [0.51, 0.86].CT with lots of argument mapping practice: The CT gain for those students taking CT courses teaching lots of argument mapping practice is S.D. 0.78, CI [0.67, 0.89].The combined effect: The combined effect of CT change for any philosophy CT course (traditional and argument mapping courses) yielded an effect size of 0.49, CI [0.39, 0.59].

Lesperance (2008) conducted research to determine the effects of problem based learning on students' critical thinking (CT) skills and disposition, the relationship between these two constructs, whether disposition predicts skill, as well as students' perceptions of PBL. Two educational methodologies were implemented to assess the effect of PBL on critical thinking (CT) disposition and skill. Critical thinking dispositions were measured by the California Critical Thinking Disposition Inventory (CCTDI) and critical thinking skills were measured by the California Critical Thinking Skills Test (CCTST). Differences in CT disposition and skill were examined between groups at the beginning, midpoint and conclusion of the semester. Separate repeated measures ANOVAs evaluated groups across time on the CCTDI and CCTST. Results on CCTDI showed that there was a significant group effect (F(2,29) = 3.443, p=.046) and group x time interaction (F(4,58) = 4.620, p=.003). Post hoc analyses using main effects testing revealed significant differences between
groups at pre test (p=.007) and mid test (p=.044) but not at post test (p=.270) while the TL and control group scores remained unchanged over time. Results also showed that PBL did not have an effect on Critical Thinking Skill as measured by the CCTST. There was no significant differences between groups (F(2,29) = .380, p=.687), across time (F(2,29) =1.674, p=.196 ) or between groups across time (F(4,58) = 1.061, p=.384) on the CCTST. Students in the TL group scored higher on the third written exam (p=.007) (the only exam administered after implementation of PBL) than the PBL group, but there was no significant difference between groups on the final lab practical (p=.392). CT disposition did not predict CT skill at pre test or post test, and there were no correlations found between age, grade level, GPA or SAT scores. However, when an outlier GPA was removed, there was a significant positive correlation between CCTDI and GPA. Survey data showed a significant difference between groups in problem solving ability and ability to defend positions. Students in the PBL group self reported that they enjoyed the opportunity to learn on their own, and reported that PBL not only motivated them to learn but also improved their attitude towards learning. Their perceptions of their ability to search for accurate information also improved. The instructor made several observations regarding the learning environment, including the enhancement of students' motivation to learn and their ability to seek out evidence based research. Although there was no statistically significant improvement with PBL, the instructor's observations of students' motivation to learn supports the notion that it can be used as a viable alternative to traditional lecture.

Quitadamo et al. (2008) in their study, “Community-Based Inquiry Improves Critical Thinking in General Education Biology” compared a research-focused teaching method called community-based inquiry (CBI) with traditional lecture/laboratory in general education biology to discover which method would elicit greater gains in critical thinking. Results showed significant critical-thinking gains in the CBI group but decreases in a traditional group and a mixed CBI/traditional group. Prior critical-thinking skill, instructor, and ethnicity also significantly influenced critical-thinking gains, with nearly all ethnicities in the CBI group outperforming peers in both the mixed and traditional groups. Females, who showed decreased critical thinking in
traditional courses relative to males, outperformed their male counterparts in CBI courses.

**Sims (2008)** in his study of efficacy of problem-based learning in promotion of critical thinking in online graduate courses found that participants were able to apply critical thinking in their teaching practices. Through the process of online problem-based learning, participants developed a habit of critical thinking and found that they changed their pedagogical practices.

**Snyder and Snyder (2008)** presented an article how actively engaging students in project-based or collaborative activities can encourage students’ critical thinking development if instructors model the thinking process, use effective questioning techniques, and guide students’ critical thinking processes. Critical thinking is a learned skill that requires instruction and practice. Business education instructors at both the secondary and post-secondary levels can enhance students’ critical thinking skills by (1) using instructional strategies that actively engage students in the learning process rather than relying on lecture and rote memorization, (2) focusing instruction on the process of learning rather than solely on the content, and (3) using assessment techniques that provide students with an intellectual challenge rather than memory recall. Several barriers can impede critical thinking instruction. Lack of training, limited resources, biased preconceptions, and time constraints conspire to negate learning environments that promote critical thinking.

**Choy and Cheah (2009)** studied that the concept of critical thinking was featured in taxonomies a few decades ago. Critical thinking is a complex process that requires higher levels of cognitive skills in the processing of information. The teachers’ perceptions of critical thinking among students influence their behaviours in the classroom. It has been found that teachers perceive they are teaching critical thinking to their students and believe that critical thinking will provide the intellectual stimuli that will facilitate critical thinking. They stated that although teachers perceive that they are encouraging critical thinking in the classroom, they are merely focusing on the comprehension of the subject matter.

**Raman (2009)** designed his research study “Collaborative Learning in the Dance Technique Class” to enhance dance technique learning by promoting critical thinking amongst students studying on a degree program at the University of Wales Institute,
Cardiff. Students were taught Cunningham-based dance technique using pair work together with the traditional demonstration/copying method. To evaluate the study, observations were recorded regularly in class during the 10-week research period and nine students were interviewed. The evaluation also included a peer observation by an experienced colleague and a video recording of each year group. It was found that pair work created a positive learning environment and instructions that promoted critical thinking and encouraged students to take more responsibility for their learning. It was noted that the process of comparing their knowledge of the movement combination with their peer's version enabled the students to learn the movement material more quickly and more accurately than when working individually.

Wang et al. (2009) in their study “Investigating Critical Thinking and Knowledge Construction in an Interactive Learning Environment” designed an interactive learning environment involving three forms of interaction: individual reflections, group collaboration and, class discussions. The purpose of this study was to investigate the extent to which the three forms of interaction promoted students' critical thinking and knowledge construction. Seventeen students at National Institute of Education of Singapore participated in this study. Their reflections and discussions were analyzed by following a content analysis approach. Results showed that writing reflections had potential to promote critical thinking but, not all students thought critically. Knowledge construction in groups and in class discussions happened at lower levels.

Pokhrel (2010) conducted a study on C T practices in mathematics classroom in Nepal. Ability to analyze, evaluate the information and the problem solving is critical thinking. In the mode of teaching with critical thinking, the class starts with classroom talk in a given topic which was discussed and dialogued among students. Then the teacher raised questions and posed problems, and students derived different solutions and justified them accordingly. He selected three secondary school mathematics teachers and six students from Kathmandu and Lalitpur districts as research participants and used qualitative research approach to pursue the study in which I used critical-constructive research paradigm. He used pre-internalize the matters and found that critical thinking practices in the classroom are useful when the teachers seem to be novice in using questioning, reasoning, providing thinking times, etc.
Cockburn and Cockburn (2011) in their article “Unsettling Assumptions and Boundaries: Strategies for Developing a Critical Perspective about Business and Management Communication” describe how a collaborative class strategy and an introductory activity were used to develop students’ thinking about business and management communication. The article focuses on teachers who want to integrate critical perspectives about business communication into their classes. A course ethos, learning groups, and an introductory activity were used to develop students’ thinking about business and management communication. These strategies encouraged collaborative peer learning in a large bicultural/multicultural lecture environment and developed learning relationships typically found in a small class context. In addition, the activities produced ongoing lecture learning groups in which business students could question their “trained incapacities,” boundaries, and assumptions gained from their experiences of communicating and managing relationships during these activities.

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 post-test 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.

Kowalczyk (2011) conducted a systematic literature review to identify teaching methods that demonstrate a positive effect on the development of students’ critical thinking skills and to identify how these teaching strategies can best translate to radiologic science educational programs. A comprehensive literature search was conducted resulting in an assessment of 59 full reports. Nineteen of the 59 reports met inclusion criteria and were reviewed based on the level of evidence presented. Inclusion criteria included studies conducted in the past 10 years on sample sizes of 20 or more individuals demonstrating use of specific teaching interventions
for 5 to 36 months in postsecondary health-related educational programs. The majority of the research focused on problem-based learning (PBL) requiring standardized small-group activities. Six of the 19 studies focused on PBL and demonstrated significant differences in student critical thinking scores.

Lai (2011) presented a research report on instruction that represented a fusion of preparation in general critical thinking principles, as well as practice in applying critical thinking skills within the context of specific domains. It was also stated that transfer of critical thinking skills to new contexts is unlikely to occur unless students are specifically taught to transfer by sensitizing them to deep problem structures and are given adequate opportunities to rehearse critical thinking skills in a variety of domains. For this, Educators are urged to use open-ended problem types and to consider learning activities and assessment tasks that make use of authentic, real-world problem contexts.

Hamann et al. (2012) in their study “Assessing Student Perceptions of the Benefits of Discussions in Small-Group, Large-Class, and Online Learning Contexts” found that a large literature establishes the benefits of discussions for stimulating student engagement and critical thinking skills. They assessed student perceptions concerning the benefits of discussions in an upper-level political science class and compared how students evaluated discussions in the whole-class environment, in small face-to-face discussion groups, and in online discussion groups. Overall, according to student surveys, small discussion groups elicited the highest student satisfaction and scored highest in critical thinking skills, while online discussions provided the best forum to express thoughts.

Rekha (2012) published an article “The Gateway to Promote Higher Order Thinking Skills: An Insight” in which it was stated that instruction that builds upon and encourages Higher Order Thinking Skills yield greater level of student learning. Much depends on methods and role of educators. Students need to know what the thinking skills are that they are learning and these need to be explicitly modelled, drawn out and reapplied in different contexts.

Watson and Glaser (2012) has developed Watson-Glaser Critical Thinking Appraisal. It has a distinguished history, dating back to its initial development in the 1920s. It was designed to measure important abilities and skills involved in critical
thinking with careful consideration of the theoretical background. Since then it has 
been used in thousands of private and public sector organisations as a selection and 
development tool and in academic settings to track the development of critical 
reasoning skills. It has been translated into many languages and is used around the 
globe. There have been a number of refinements and developments to the test since its 
launch. These revisions were undertaken to incorporate enhancements requested by 
customers while maintaining the qualities that have made the Watson- Glaser the 
leading critical thinking appraisal for nearly a century. Both Watson (1925) and 
Glaser (1937) were working on the measurement of critical thinking from early on in 
their careers. In 1964 two 100 item parallel forms (Ym and Zm) were published under 
the name Watson-Glaser Critical Thinking Appraisal in the USA (Watson and Glaser, 
1964). The forms were revised in 1980 to update the language, improve clarity and 
eliminate racial and gender stereotypes (Watson and Glaser, 1980). The new forms, A 
and B, were shorter at 80 items but otherwise retained the basic test structure. The 
first UK adaptation – Form C (Watson and Glaser, 1991) was based on the US form B 
which had already been in wide use in the UK with senior managers and high value 
occupational settings. American-English vocabulary and usage was replaced and 
content changed where not appropriate for a UK test taker. In 2000, minor revisions 
were made to form C and an extensive UK norming and standardization exercise was 
also undertaken. The result was the 80 item WGCTAUK (Watson, Glaser and Rust, 
2002). A shorter 40 item form was developed in 1994 for use in employment related 
training and career development contexts. This used a subset of the Form A items and 
was published initially as Form S (Watson and Glaser, 1994; Watson and Glaser, 
2008).

Yeh (2012) carried out the study “A Co-Creation Blended KM Model for Cultivating 
Critical-Thinking Skills” to find out that both critical thinking (CT) and knowledge 
management (KM) skills are necessary elements for a university student's success. 
Therefore, this study developed a co-creation blended KM model to cultivate 
university students' CT skills and to explore the underlying mechanisms for achieving 
success. Thirty-one university students participated in this study. Findings from the 
17-week training program suggest that scaffolding university students through 
knowledge sharing, internalization, and co-creation processes in a blended KM 
environment can effectively enhance their CT skills. Moreover, the attribute-treatment
interaction (ATI) analysis suggests that judicial thinking style which relates to a deep learning approach may facilitate KM and help improve CT skills. Notably, the complex underlying mechanisms and paths of influence found in this study attest to the highly dynamic nature of the proposed KM processes.

2.1.1 REVIEW OF LITERATURE RELATED TO COOPERATIVE LEARNING AND CRITICAL THINKING

Scriven and Paul (1987) views critical thinking as a process of methodically conceptualizing, applying, analyzing, synthesizing and evaluating information gathered from sources to incorporate it as new knowledge learnt is similar to the steps involved in doing a case study. As students work in small groups, they are able to imbibe the virtues of cooperative learning such as positive interdependence, excellent team work strategies and effective interaction among members to develop broader perspectives on an issue.

Johnson and Johnson (1989) conducted a meta-analysis of 375 experimental studies on cooperative learning strategies that shows that this process do help in improving students’ higher-order thinking skills that indicates that cooperation results in significantly higher achievement and retention than do competitive and individualistic efforts. It was found that besides higher productivity and retention, cooperation resulted in more higher-order reasoning, creative thinking, transfer of learning, wanting to invest time on task, and persistence to take on more challenging tasks.

Rabow et al.(1994) stressed that the shared learning gives students an opportunity to engage in different discussion activities that not only increase and deepen the understanding of course material but engender critical thinking and deepens the levels of learning. They added that cooperative learning activities also lead to the development of a range of skills such as verbal, analytical and interpersonal skills, which will last long beyond the immediate tasks.

Qin et al. (1995) compared the impact 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

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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.

Carrodus (1998) conducted a study on “Participation of low-achieving students in cooperative small-group problem solving in mathematics” in Simon Fraser University (Canada). The research method involved the videotaping of groups of students as they worked on four different problems during the second semester of their Math 10 course. These problems were ones for which they had not already been shown a method of solution. Videotapes were later reviewed, transcribed and analyzed, with particular attention to the way students interacted and how students of differing ability differed in their contributions. Study has indicated one important aspect of student involvement which has become the main focus of the study: the surprisingly high participation and contribution level of low-achieving students to group problem solving.

Wesp and Montgomery (1998) in their study,” Developing Critical Thinking through the Study of Paranormal Phenomena” argued that accounts of paranormal phenomena can serve as an ideal medium in which to encourage students to develop critical-thinking skills. They used a cooperative-learning approach to teach critical thinking in a course on paranormal events and they reported due to cooperative learning critical-thinking skills increased and that the course received favorable student ratings.

Somapee (2002) compared critical thinking skills of students who studied Business English at Chiangrai Commercial School using the cooperative learning method with those of students using the traditional group work method and surveyed the opinions of students toward the cooperative learning method. A pre-test was used to assign students so both had the same level of the critical thinking skills. During the eight
weeks of teaching, unit pre-tests and post-tests were given to students at the beginning and at the end of each unit respectively. After the implementation, the pre-test was assigned for them to take as the post-test. Then, two sets of averaged scores taken from the pre-test and post-test were compared by t-test. A questionnaire was then given to the experimental group to assess their opinion about cooperative learning. The results of the test revealed that critical thinking skills of students in the experimental group were higher than those in the control group. The post-test scores of students who were taught through the cooperative learning method were remarkably higher than the post-test scores of students who were taught through the traditional group work method at p < .05 level. Moreover, the unit post-test scores of the experimental group were higher than those of the control group as the statistical difference was significant at p < .05 level. The results of the questionnaire showed that students' opinions towards the cooperative learning were moderately positive.

**Abdulghani (2003)** took up the study to investigate the impact of implementing cooperative learning on critical thinking skills and achievement in Arabic language by grade ten female students in the United Arab Emirates. Nonrandomized Control Group Pre-Test/Post-Test Design was used in this study. Four classrooms of students were examined: the two experimental classrooms consisting of 33 students and 31 students and the control group consisting of 33 students and 29 students. All students were in grade ten. The experimental groups were exposed to the cooperative learning method, while the control groups were exposed to the lecture method. Two participant teachers were involved; each one taught one experimental and one control classroom. The experiment duration was eight weeks. This researcher personally trained the teachers participating in this study to implement the cooperative learning techniques. The dependent variable in this study is the level of measurable critical thinking skills as measured by the Watson-Glaser Critical Thinking Appraisal and achievement scores as measured by the teachers' achievement test. Reliability and validity of the tests were established. All four classrooms, two experimental and two control, completed a pre-test on critical thinking and a pre-test on achievement prior to the experimental manipulation. The critical thinking pre-test is a form of the Watson-Glaser Critical Thinking Appraisal. A teacher achievement test was also used as a pre-test, and another achievement test was used as a post-test to find the effect of cooperative learning on achievement in the classroom subject of Arabic language.
A multivariate MANCOVA for the dependent measures was conducted. The comparisons were made to test the differences between the instructional methods of lecture and cooperative learning on critical thinking and achievement. The results showed no statistically significant impact between the two methods of teaching on critical thinking or achievement in Arabic language.

Lee (2003) carried out a study to investigate the Impacts of cognitive structuring methods on students' critical thinking enhancement in on-line collaborative learning. The purpose of the study was to learn ways to promote critical thinking skills in this emerging learning environment and to investigate the impact of the cognitive structuring methods on students' critical thinking skill development. For the purposes of the study, critical thinking skills were identified as application, analysis, synthesis, and evaluation, based on Bloom's (1956) taxonomy of learning objectives in the cognitive domain. Three cognitive structuring methods in online collaborative learning environment were also identified as: suggesting framework, progress review, and message labeling. For the experiment 78 Subjects were divided into four groups, one control group, which received no cognitive structuring method, and one group for each of three different cognitive structuring methods. The transcripts of the posttest and online discussion were analyzed with protocol analysis. For statistical analysis loglinear analysis and series of Chi-square tests were used to see group differences on each type of critical skill. The analysis produced mixed results regarding the impact of suggesting cognitive structuring methods on critical thinking skill enhancement produced. A discontinuity between the discussion session and posttest session was also found. This discontinuity suggests to us that having longer time duration would improve the test results. Our finding also suggests that using cognitive structuring methods that depend on too complicated or overriding use of technology would decrease the effectiveness of the methods.

Ghaith and El-Malak (2004) examined the effect of the cooperative Jigsaw II method on improving literal and higher order reading comprehension in English as a foreign language (EFL). Forty-eight (n = 48) students of EFL participated in the study and a pretest-posttest control group experimental design was employed. The results indicated no statistically significant differences between the control and experimental group on the dependent variables of overall reading comprehension and literal
comprehension. However, the results revealed a statistically significant difference in favor of the experimental group on the variable of higher order comprehension.

**Joung and Keller (2004)** found that the terms "cooperative" and "collaborative" are used interchangeably in reference to group learning activities in classrooms and in online settings. However, they can be viewed as differing in terms of characteristics such as pre-structure, task structure, and content structure. In their study “The Effects of High-Structure Cooperative versus Low-Structure Collaborative Design of Decision Change, Critical Thinking, and Interaction Pattern during Online Debates” they attempted to clarify these differences and the effects of the two types of groups on learner performance in an online debate. The study investigated the effects of a highly structured cooperative learning (HSCP) group, which had pre-assigned debate positions as a pre-structure, argumentation scaffolding as a task structure, and evaluation scaffolding as a content structure, compared to a low structured collaborative learning (LSCL) group, which did not have these structures, in terms of pre-service teachers’ decision changes, critical thinking, and interaction patterns. Results demonstrated that there were greater amounts of critical thinking and of critical and dynamic interaction patterns in the HSCP than LSCL group.

**Klimoviene et al. (2006)** researched on the significance of cooperative learning activities in developing students’ critical thinking on 90 second year Economics and Management students in Business English classes. The activities here included asking pertinent questions, debating ideas, summarizing and synthesizing, critiquing ideas and communicating. The findings revealed a positive correlation between cooperative learning and their performance in the above activities. The research also revealed that students became better in making critique, developing their own position and making better decision based on support and confidence from group members.

**Riley and Anderson (2006)** undertook the “Randomized Study of the Impact of Cooperative Learning: Distance Education in Public Health” to explore the effects of cooperative learning on cognitive outcomes in a public health graduate level Web-based distance education course. Specifically, the authors use a randomized control trial to determine the impact of two teaching pedagogies on learning effectiveness in three areas of the cognitive domain: (1) declarative knowledge; (2) procedural knowledge; and (3) higher cognition. This study examines various learner outcomes.
in distance education as influenced by cooperative learning. This study shows that cognitive learning outcomes are affected by cooperative learning when compared to self-study. While there was no difference in declarative knowledge and procedural knowledge, the cooperative learning pedagogy resulted in a 5% improvement in procedural knowledge and higher cognition capabilities compared to the self-study pedagogy. This research shows that cooperative learning experiences can be incorporated into distance education and results in advanced knowledge acquisition in the areas of public health inquiry, critical thinking, and problem solving when compared to self-study approaches.

Rashtchi (2007) attempted to explore whether cooperative writing enhanced critical thinking in learners of English as a Foreign Language (EFL). Students were randomly assigned to two groups; that is, experimental and control. Cooperative writing was used in the experimental group while the control group practiced writing individually. The treatment took 14 sessions, and then the students were required to take the same critical thinking questionnaire used before the treatment. Moreover, participants’ final writings were corrected on writing profile and the means of the writings of the two groups were compared. The analysis indicated that there was a statistically significant difference between the writing performances as well as critical thinking ability of the two groups.

Rumpagaporn and Darmawan (2007) carried out the study-“Students’ Critical Thinking Skills in a Thai ICT Schools Pilot Project”, examining to what extent the Thai ICT (information and communication technology) schools have classroom learning environments that are associated with certain teacher characteristics using questionnaires, interview surveys, and computer-based classroom observations in order to collect data from 13 Thai ICT model schools. The data analysis was carried out using statistical analysis techniques as well as using descriptive analysis. It is proposed that students can be assisted to learn critical thinking skills that have particular supportive learning environments. The significant findings offer opportunities to develop and support students' critical thinking skills through cooperation between students and their peers to achieve their student assignments among cooperative classroom learning environments with ICT.
Bokeoglu (2009) conducted a study to examine the effect of the introduction to statistics course realized on cooperative learning environment on critical thinking skills, statistics achievement and statistics attitude. The subjects of the study were the first year students of department of guidance and psychological counseling. 37 students were assigned to the experimental group that took the introduction to statistics course on cooperative learning environment and 32 students were assigned to the control group that took the same course with traditional method. The findings showed there were not significant differences between the experiment group and the control group in term of critical thinking skills, statistics achievement and statistics attitude.

Brooks (2009) in his study “Regular College Preparatory Students' Perceptions of the Student Teams Achievement Divisions Approach in an Academic College Preparatory Biology Class” found that cooperative learning allows individuals with varying abilities to work alongside their peers. Students are placed into achievement levels based on placement test scores. The Regular College Preparatory (RCP) level is a score of 59% or lower and Academic College Preparatory (ACP) level is a score of 60-92% on the placement test. The purpose of this study was to obtain 9th grade RCP students' perceptions of the student teams achievement divisions (STAD) approach which allows each member of a team to have a defined role in group work. The research questions addressed 9th grade RCP students' perceptions of integrated STAD teams. Qualitative data from 6 RCP participants were collected from interviews and observations. Data were analyzed using typological analysis by creating codes and categories. Findings indicated that RCP students retained more content and enhanced their skills in communication, critical thinking, and problem solving.

Goyak (2009) studied the effects of cooperative learning techniques versus lecture techniques on the following aspects of a higher education classroom: (a) the perception of a student's learning environment; and (b) a student's critical thinking skills. Pre service teachers at a small Midwest college completed the College and University Classroom Environment Inventory (CUCEI) and the Watson-Glaser Critical Thinking Appraisal, Form-S (WGCTA-FS). Results revealed significantly higher means in the cooperative learning group in four of the eight constructs within the CUCEI. Results within the WGCTA-FS disclosed no significant
differences between the means of the two groups. The outcomes of this study suggest that cooperative learning techniques have merit and profit in the undergraduate classroom.

**Quitadamo et al. (2009)** in their study, “Peer-Led Team Learning: A Prospective Method for Increasing Critical Thinking in Undergraduate Science Courses” examine the impact of PLTL on critical thinking gains in science and math courses at a research university in the Pacific Northwest. Results of this study show that PLTL has a small but positive impact on critical thinking gains in some science courses, and that it improves grade performance and retention in science and math courses, particularly for females. While math students did not show significant critical thinking gains, it is premature to conclude that PLTL does not promote critical thinking in math. Many factors affect the development of critical thinking skills, and more study is necessary to discover their influence. These results indicate PLTL has potential to improve undergraduate critical thinking.

**Guvenc (2010)** studied the effects of Cooperative Learning and Learning Journals on Teacher candidates’ self-regulated learning to investigate the effects of cooperative learning and learning journals on teacher candidate students' self-regulated learning. Data of the research were collected by the Turkish version of the Motivated Strategies for Learning Questionnaire. 84 university students (52 girls and 32 boys) participated in this research. A quasi pre-test/post-test experimental design with control group was utilized. Both groups were taught by cooperative learning. The experimental group wrote their reflection in learning journals. The research has discerned that there is a difference between experimental and control groups and experimental groups’ students have been affected more positively on self-efficacy for learning and performance, elaboration, organization, critical thinking and meta cognitive control strategy dimensions of self-regulated learning.

**Ismail et al. (2010)** conducted a study to investigate the effects of mind mapping with cooperative learning (MMCL) and cooperative learning (CL) on: (a) programming performance; (b) problem solving skill; and (c) metacognitive knowledge among computer science students in Malaysia. The moderating variable is the students' logical thinking level with two categories: high logical thinking (HLT) ability and low logical thinking (LLT) ability. The study further investigated the effects of MMCL
and CL among the students with high logical thinking (HLT) and low logical thinking (LLT) on the three above mentioned dependent variables. A quasi-experimental study with posttest-only control group method that employed a 3 x 2 Factorial Design was applied in the study. The sample consisted of 127 students from 2 classes in three University Technology MARA campuses which were all randomly selected and assigned to the treatment groups (MMCL and CL) and control (T) group. The equivalence of all groups was established using the homogeneity test between the three groups based on the students' Malaysian Education Certificate (SPM) grades in Mathematics, Additional Mathematics, Physic, and Chemistry subjects. The results showed that the students in MMCL and CL groups have significant positive overall effects in programming performance, problem solving skill, and metacognitive knowledge. Students taught via the MMCL method significantly outperformed the students taught via the T method in programming performance and meta cognitive knowledge. Meanwhile, students taught via the CL method significantly outperformed the students taught via the T method in meta cognitive knowledge. Even though there was no significant effect between MMCL and CL on any dependent variables, the descriptive statistics for programming performance and meta cognitive knowledge between the three instructional method groups did show some positive effects. For the effects of instructional methods on programming performance mean scores, there were two major findings. First, the results showed that the overall mean scores for programming performance for the students taught via MMCL method were higher than the CL group whose scores were, in turn, higher than the scores of the students taught via the T method. Second, both HLT and LLT students' mean scores in programming performance for MMCL method were higher compared to the mean scores acquired by the CL and T methods. For the effects of instructional methods on meta cognitive knowledge mean scores, there were two major findings. First, the results showed that the mean scores for meta cognitive knowledge for the LLT students taught via MMCL method was higher than LLT students taught via CL method whose scores, in turn, were higher than the LLT students taught via the T method. Second, the results showed that the HLT students taught via the CL method outperformed the HLT students taught via the T method in meta cognitive knowledge. The results of this study also showed that the difference between HLT and LLT students among the three instructional methods were significant, overall in both
programming performance and problem solving skills. Further analysis revealed that the HLT students taught via both MMCL and CL methods significantly outperformed the LLT students taught via the same method in problem solving skills. Finally, the results showed that there were no significant interaction effects between the instructional methods and the students' logical thinking levels for programming performance, problem solving skills, and meta cognitive knowledge scores. The findings of this study suggest that mind mapping with cooperative learning method (MMCL) is preferred compared to CL and T methods in programming performance, problem solving skills, and meta cognitive knowledge for students of all logical thinking levels.

Gillies et al. (2012) found that teaching students to ask and answer questions is critically important if they are to engage in reasoned argumentation, problem-solving, and learning. Their study “The Effects of Two Strategic and Meta-Cognitive Questioning Approaches on Children's Explanatory Behaviour, Problem-Solving, and Learning during Cooperative, Inquiry-Based Science” involved 35 groups of grade 6 children from 18 classrooms in three conditions (cognitive questioning condition, community of inquiry condition, and the comparison condition) who were videotaped as they worked on specific inquiry-based science tasks. The study also involved the teachers in these classrooms who were audio-taped as they interacted with the children during these tasks. The results showed that while there were no significant differences in the children's explanatory behavior across the two time periods, there were significant differences in the total verbal interactions between the children in the cognitive questioning condition and their peers in the community of inquiry and comparison conditions. Furthermore, the children in the cognitive questioning condition obtained higher reasoning and problem-solving scores than peers in the other conditions. Interestingly, while there were no significant differences between the teachers' basic and extended mediating behaviours in the three conditions at Times 1 and 2, there was a significant difference in extended mediation behaviours with the teachers demonstrating nearly three times more extended mediation to promote students' learning at Time 2 than they did at Time 1. Teacher intervention in providing guidance in how to interact during cooperative, inquiry-based science appears to be critical to helping students engage in higher-level thinking and learning.
2.1.2 SUMMARY OF REVIEWS RELATED TO CRITICAL THINKING

The related reviews give an insight on the status of Critical thinking in the present Educational Scenario. CT is a meta-cognitive process that should be inculcated from the early adolescent stage only (Alpay, 2003). Review of literature reveals that CT can be taught effectively through various ways like guided discovery Learning (Smitha and Rao, 2000); by infusing it into curriculum practice (Eichhorn, 2003; Bailin et al., 1999); inquiry based curriculum (Lampert, 2005); quality instruction with home based remediation (Malhotra, 2006); Cognitive-Infusion Module (Kong, 2007); argument mapping, (Ortiz, 2007); problem based learning (Lesperance, 2008; Sims, 2008; Kowalczyk, 2011; Lai, 2011); Community based inquiry (Quitadamo), collaborative activities (Synder and Synder, 2008); case study and Socratic Questioning (Meghani, 1999) and Models of teaching (Robinson, 1996).

Some studies have reported that learning through cooperative learning methods had positive effect on CT skills (Rabow et al., 1994; Wesp and Montgomery, 1998; Joung and Keller, 2004; Klimoviene et al., 2006; Riley and Anderson, 2006; Rumpagaporn and Darmawan, 2007; Rashchi, 2007; Brooks, 2009; Raman, 2009; Guvenc, 2010). Cooperative learning has also shown significant effect on problem solving and higher order reasoning in meta analysis of 46 studies (Qin, 1995) and other higher order thinking skills (Johnson and Johnson, 1989). Few Studies in which Small group activities were used also reported significant improvement in critical thinking skills (Baseda, 1983; Gokhale, 1995; Elliott, 1996; Hamann et al., 2012.) Interactive environment improves critical thinking (Wang et al., 2009). Gillies (2012) reported that teaching students to ask and answer questions is critically important if they are to engage in reasoned argumentation, problem-solving, and learning. Only three studies have reported that Cooperative learning had no effect on CT skills (Abdulgani, 2003; Bokeoglu, 2009; Goyak, 2009). Quitadamo et al. (2009) reported peer led team learning has positive but no significant effect on CT in Science and Mathematics.

There is inconsistency among researchers regarding the relationship between critical thinking skills and critical thinking dimensions. Some studies have reported positive correlation (Giancarlo and Facione, 1994; Facione, 1997 and 2000), But
Lesperance (2008) reported critical thinking skills and critical thinking dimensions have no positive correlation.

Review of literatures reveals that there is inconsistency of results of critical thinking in relation to gender because few studies have reported boys have more critical thinking as compared to girls (King and Kitchener’s, 1994; Harish, 2011). Few studies reported females have more critical thinking as compared to males (Rudd et al., 2000; Walsh, 1996; Wilson, 1989 in Claytor, 1997) and few have reported male and female have equal scores which means gender to be independent of critical thinking (Kuhn’s, 1992; Baxter-Magolda, 1992; Dewey, 1995; Claytor, 1997; Alpay et al. 2003).

CT is negatively correlated with age and positively related to education (Denny, 1995; Howenstein et al., 1996) and CT is positively related with internal motivation (Facione, 2000). Review of Literatures also showed that no study is undertaken to see the effect of jigsaw method of cooperative learning on Critical thinking of school students in India or abroad.

2.2 REVIEW OF LITERATURE RELATED TO SOCIAL COMPETENCE

Green et. al. (1980) examined the relationship among the measures of school aged children’s social competence and their relationship to an academic measure. 116 third grade children served as subjects. A co-relational matrix and factor analysis were performed on the data. The results indicated that the children with high academic achievement scores were liked by and interacted positively with peers. Negative peer interaction was not related to popularity while positive peer interaction was negatively correlated with peer dislikes. Teacher ratings suggested that teachers can identify children who are liked and disliked by their peers. The child self report measures produced few correlations with other measures. The factor analysis resulted in the identification of 5 factors –social status, teacher perceived deviance, sociability, academic and peer aggressiveness.

Hartup (1992) reported that peer relationships in particular contribute a great deal to both social and cognitive development and to the effectiveness with which we function as adults. He states that "the single best childhood predictor of adult adaptation is not school grades, and not classroom behavior, but rather, the adequacy
with which the child gets along with other children. Children who are generally disliked, who are aggressive and disruptive, who are unable to sustain close relationships with other children, and who cannot establish a place for themselves in the peer culture are seriously at risk".

Ladd et al. (1999) found that interpersonal skills facilitated classroom adaptation and participation, which in turn promoted higher academic achievement. A sample of 200 full-day kindergarteners from urban and rural communities in the mid-western United States were rated on peer acceptance, number of mutual friendships, quality of relationship with their teacher, and classroom participation by trained observers. The participants were also administered the Visual and Quantitative composites of the Metropolitan Readiness Tests (MRT) at the end of kindergarten to assess academic achievement. The authors found that children with prosocial behavioral styles tended to develop a larger number of mutual friends, higher levels of peer acceptance and stronger relationships with their teachers, as well as more adaptive classroom participation styles. Direct links were identified between children's classroom relationships and participation and higher academic achievement. Thus interpersonal factors in the kindergarten setting, namely behavioral styles and peer and teacher-child relationships, emerged as important antecedents of achievement.

Kinsey (2000) conducted a study to find out the relationship between prosocial behaviors and academic achievement in the primary multiage classroom and concluded that children's current and long-term social-emotional developments, as well as cognitive and academic development, are clearly affected by the child's social experiences with peers and adults. It is important to keep in mind that children vary in social behavior for a variety of reasons.

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.
Wentzal and Caldwell (2002) investigated two samples of 6th graders over time to examine number of reciprocated friendships, peer acceptance and group membership to academic achievement. In both samples, group membership was the most consistent predictor of grades over time. In another study, prosocial behaviour, antisocial behaviour emotional distress were examined as processes that might explain significant links between peer relationships and academic achievement. Results of longitudinal analysis support a conclusion that aspects of peer relationships are related to classroom achievement indirectly, by the way of significant relations with prosocial behavior. Future research might benefit more in-depth analysis of the functions of adolescent peer relationships and the processes by which they influence orientations toward social and academic competence at school.

Dhanda et. al. (2008) conducted a study “Social Competence among Children”. The present investigation was carried out in two states Haryana and Rajasthan purposively to compare the effects of geographical and cultural differences in the social skills of pre-schoolers. From Haryana state, Hisar city and from Rajasthan, Udaipur city was selected as locale of study. Experimental material comprised 120 pre-schoolers selected from both the districts Hisar (60) and Udaipur (60) during the age of 2-4 years. Vineland Social maturity Scale (Doll,1935) was used to assess social competence of children. Results showed that the boys were better in social skills than girls in Hisar but at par in Udaipur. The difference in social development was clear over the location for the children as the children of Hisar surpassed the children of Udaipur in social skills.

Bhandari (2011) in a study on Effect of awareness Training Model on life skills and personal value of secondary school children in relation to their psychological hardiness, reported that students taught through Awareness training Model achieved higher gain mean scores on social skills than those who were studying from conventional group learning situation.

Yadav and Singh (2011) undertook a study to compare the social competence and attitude towards computer among undergraduate students. For this purpose, descriptive survey type of research was used. Data was collected from randomly selected 320 undergraduate students of the urban and rural areas of Kanpur in Uttar Pradesh (U.P.). Social competence scale and Computer attitude scale were
administered on the selected sample. The result showed that Social Competence of Undergraduate male students was more than that of Undergraduate female students. Social Competence of Undergraduate urban students was more than that of undergraduate rural students. Significant difference was found in attitude towards computer between Undergraduate urban and rural students but there was no significant difference between male and female students.

Leung (2012) invited sixty teachers (n = 60) and sixty children (n=60) in six kindergartens to participate in the study, “Enhancing Social Competence and the Child-Teacher Relationship using a Child-centered Play Training Model in Hong Kong Preschools.” In Phase One, thirty of these teachers (n=30) were randomly assigned a child with either internalizing problems or externalizing problems. A 10-week child-centered play training model was used to reduce the children’s problems and promote the child-teacher relationship (CTR). The other thirty teachers and thirty children with either internalizing problems or externalizing problems were placed in the control group. In Phase Two, the teachers and children in the control group received the same 10-week child-centered play training. The purpose of this study was to examine whether the child-centered play training model enhances child-teacher interaction and thereby reduces children’s internalizing problems (such as anxiety/depression and withdrawn) and externalizing problems (such as aggressive and destructive behavior). It was found that the child-teacher interaction was enhanced through an increase in communication of acceptance, that is, allowing the child to lead and becoming involved in play with the child. Children’s internalizing and externalizing problems were reduced after 10 sessions of child-centered play, especially for aggressive behaviour.

Anme et. al. (2013) conducted a study to validate the Social Skill Scale (SSS) as an evidence-based practical index of social competence. In total, 30,993 preschool children participated in the study. Childcare professionals evaluated participants with the SSS. Results indicated a highly rigid structure of 3 factors corresponding to social competence- cooperation, self-control and assertion. Cronbach’s alpha coefficients ranged from 0.91 to 0.93 across the sampled age groups. These factors also positively correlated with the Child Development Scale. The SSS is able to measure social competence with high validity and reliability. Thus, the SSS is a helpful tool for understanding the development of social competence.
2.2.1 REVIEW OF LITERATURE RELATED TO COOPERATIVE LEARNING AND SOCIAL COMPETENCE

Johnson et al. (1978) stressed that the use of cooperative learning promoted higher self-esteem among students. They examined 30 students, with 14 in a non-cooperative classroom and 16 in a cooperative learning classroom. The students in the cooperative learning classroom were given a pre-test as well as a post-test to determine what group members they enjoyed being with during group work. It was revealed that self-esteem increased while working with cooperative group members.

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 student achievement and attitudes on 205 seventh graders 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, reward 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. Comparison group effect in favour of comparison with equals were supported for feeling of being liked, liking of others, peer support for academic performance and number of friends named. No academic achievement effect 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 Education Testing Service found that teacher, workshop, 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 races to work with each other and the participation of students in multi-racial sports teams had strong, consistent, positive effects on race relations.

Cooper et al. (1980) studied the effects of cooperative, competitive and individualistic experiences on cross-ethnic, cross-sex and cross-ability interpersonal attraction on 60 seventh graders 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 condition. 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.

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 student team learning with positive classroom involvement, increased number of friends, higher academic expectation and increased self-confidence.

Okebukola (1986) conducted a study “Reducing anxiety in Science Classes: An Experiment involving some models of class interaction”. As we know anxiety has consistently been shown to have depressing effect on students’ achievement in Science. The effects of three models of class interaction – cooperative, indirect teacher interaction and cooperative learning with indirect teacher interaction – in reducing the anxiety level of students were examined. Data were collected from 163 students involved in pretest posttest experiment with control group. The three models of interaction were found to be better than control in reducing students’ level of anxiety. Of the three models, the cooperative learning with indirect teacher interaction technique was found to lead to greatest reduction in anxiety level.

Morgan and Jenson (1988) suggested that more effort should be devoted to changing the perception that social skills instruction is a frill rather than a necessity for special needs students. They recommended the following considerations for integrating a social skills intervention program: (a) social skills instruction should have equal emphasis with academic instruction; (b) teachers and other school personnel should be adequately trained in social skill instruction; (c) sufficient instructional time must be given to SST; (d) SST should be a collaborative effort among all professionals who are involved in the student’s instructional program; (e) SST should be threaded throughout the curriculum and take advantage of incidental teaching opportunities, and (f) student progress in social skills should be evaluated in the same way that academic skills are measured.
Lickona (1991) in a two year study of a Cooperative Elementary School Model involved 2 treatment schools, 3 comparison schools, and 102 students. Findings indicated positive effects on academic achievement and social relations after the cooperative learning model was implemented. Cooperative learning helps to teach children that they can do more together than they can do alone.

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.

Nowak (1996) explored the effects of a cooperative learning programme on academic performance, cooperative interactions during lesions, and pro-social behaviours during play activities in integrated kindergarten classrooms. Pro-social behaviours were assessed by direct observation in a free play outside the classroom. Results indicated that Pro-social skills 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 parent found the cooperative learning procedure to be effective and acceptable.

Bromley and Modlo (1997) in their descriptive study of four teachers who implemented the Kagan Structural Approach during reading and writing instruction demonstrated the following benefits: 1) higher level thinking, 2) better communication between students, and 3) positive social relations.

Jordan and Metais (1997) identified the lack of social skills on the part of some school students is one contributory factor in student misbehavior. 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.

**Whicker (1997)** investigated the effects of cooperative learning on student achievement and attitudes on the mathematics students of secondary class. One group studied in cooperative learning group and another group studied the material independently. Results revealed that students in the cooperative learning group had increasingly higher test scores than students in the comparison group and survey 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 concepts.

**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 found the there was no relationship between the self-efficacy measure and the requisite skill (i.e. mathematic 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.

**Earley (1999)** investigated the effect of cooperative learning on the group work and social skills interaction of 64 *social studies* student 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 member. Results of the survey indicated that social skills taught through cooperative learning methodology increased group effectiveness as well as interpersonal interaction.

**Veenman et al. (2000)** examined the use of 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.

Kalaiyarasan and Krishnaraj (2004) in their study on “Cooperative Learning: Enhancing self-esteem of Learners” tried to find out whether the STAD approach with reward is more effective than the traditional approach in developing the self esteem of learners, besides investigating whether the group investigation approach without reward scores over the traditional approach in enhancing the self-esteem of the learners. Two sections of IX class was taken as the sample of the study namely experimental group and control group. The groups consisted of 48 students each. 6 topics of Biology were taught for 60 days and it was found that STAD approach was better than traditional method of teaching.

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.

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 peer 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.

Cavalier et al. (2006) in their study “Effects of cooperative learning on performance, attitude, and group behaviors in a technical team environment” divided 274 participants who were engineering employees enrolled in a required training class into unstructured small groups and cooperative teams. Instruction was the same for all participants. Only the practice portion of the lesson reflected cooperative strategies versus no process direction. Results indicated that the practice conducted in a cooperative manner had a significant effect on performance and group behaviors. Participants in the cooperative teams performed better on the posttest, enjoyed working in teams, perceived more accomplishment, and displayed higher levels of social and cognitive interaction than participants who worked in unstructured small groups. Implications for integrating cooperative strategies into technical team training are provided.

Fantuzzo et al. (2006) used an updated, more comprehensive meta-analytic approach to examine the effects of PAL strategies (peer tutoring and cooperative learning) on socio-emotional outcomes for elementary school students than research syntheses in the past. The findings provide stronger evidence than prior studies that academic PAL interventions result in positive, small-to-moderate effects on social, self-concept, and behavioral outcomes. In addition, significant positive relationships were found between these social and self-concept outcomes and student achievement.
Goudas and Magotsiou (2006) in his study on “The Effects of a Cooperative Physical Education Program on Students’ Social Skills” took a sample of four sixth graders and they were divided into two groups i.e. experimental and control group. Each group consisted of 57 students. The experimental group received a cooperative learning program. The students completed self and peer forms of the Multisource Assessment of Children’s Social Competence (Junttila, Voetan, Kaukiainen and Vauras, 2006) and Feelings Towards Group Work Scales (Cantwell and Andrews, 2002) before and after the program. Results showed enhanced social skills and attitudes toward group work shortly after the completion of the program. More specifically, students who participated in the program, compared to those of a control group, increased their cooperative skills and empathy, and decreased their quick-temperedness, and their tendency to disrupt. These findings held both for self-reports and for peer assessment. Moreover, students who participated in the program increased their preference for working in groups, and decreased their discomfort with group work.

Klimoviene and Statkeviciene (2006) conducted a study on the topic “Using Cooperative Learning to Develop Language Competence and Social Skills”. In their study, they took a sample of 46 master students majoring in Economics. The students were grouped to create heterogeneous groups. Group 1 consisted of 17, group 2 of 15 and group 3 of 14 students. The students had English 2 hours a week and stayed together for 12 weeks. The groups were involved in cooperative learning activities. The results of the experimental group were compared with those groups in which lecturers applied traditional instructional methods. 87% of the students pointed out that they found cooperative learning to be the most satisfying of all the learning activity forms. 89% of the students claimed to have developed at least some of the following social skills (problem solving, decision taking, conflict handling, negotiating, leading, delegating, listening, presentation making) necessary in their future work environment as well as personal qualities (high degree of motivation, enthusiasm, self-confidence, self esteem, ambitiousness, responsibility and creativity).

Pahuja and Kaur (2006) in their article “The Power of Cooperative Learning” expressed the importance of cooperative learning. In a country like India where owing to the over rising population, there are a large number of students on an ordinary
class. This factor and other constraints (like time, syllabus) restrict the teacher to pay proper individual attention to the students. Here the strategy of cooperative learning comes to rescue, which makes the teaching simpler and learning better. Cooperative learning has the potential to help the learner feel good about themselves, about their peers, about the school, about what they are learning, thereby making learning more effective.

Dasan (2007) in his article “Learning Together: Social Goals of Cooperative Learning” concluded that cooperative learning can be an educational strategy at all levels – from L.K.G. to P.G. It can be extended even beyond formal educational levels and can be applied in manifold life situations. The person feels better about himself, the class and his classmate by learning through cooperative learning. In conclusion cooperative learning helps us to realize our social goals.

Gillies (2008) investigated the effects of structured and unstructured cooperating groups on students’ behaviors, discourse and learning in junior high school. One hundred and sixty-four grade 9 students participated in the study. The students were videotaped as they worked in three to four person, mixed-gender and ability groups on a science-based categorization activity. The results show that the students in structured cooperating groups demonstrated more cooperative and helping behaviors such as giving more elaborated help and guided directions to assist understanding than their peers in the unstructured groups. Moreover, they demonstrated more complex thinking and problem-solving skills both in their discourse and their responses on the follow-up learning probe.

Sharma and Sharma (2008) conducted a study on the topic “Effect of Cooperative Learning on Interpersonal Relationship of Elementary School students”. In this study that tries to find out whether the STAD approach with reward is more effective than the traditional approach in enhancing interpersonal relationships among elementary school students. They used purposive sampling and pretest posttest control group quasi experimental design was selected for the purpose. 80 students of class VII (40,40) from S. R. S. Sr. Sec. School, Rohtak were taken as samples of the study. The investigators found that Cooperative learning strategy STAD significantly improves the achievement, interpersonal relationship and self-esteem of students.
Bertucci et al. (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.

Shimazoe and Aldrich (2010) in their study discussed several benefits on the use of cooperative learning approach for students. It promotes deep learning of materials, students achieve better grades in cooperative learning compared to competitive or individual learning, students learn social skills and civic values, students learn higher order thinking skills, students develop positive attitudes towards autonomous learning.

Mohseen and Fauzee (2011) in their study “Issue of The Social Dilemmas After Wars : A cooperative Learning Intervention Though physical education and Its Effect on Social Skills Development Among Middle School Students’ in Baghdad, Iraq” experimented on 60 students. A pre-test was taken and then they were taught through STAD strategy. After a period of six weeks, post-test I was taken and then after twelve weeks post-test II was taken. Then the results were interpreted which showed considerable success in the cooperative learning classes to improve the social skills among the middle school students.

Al-Semairi (2012) studied the Effect of using the cooperative learning strategy on developing the social skills of students in college of Education, King Saud University in Riyadh. A list of social skills was designed to observe skills of 135 students (research sample) the researcher applied pre-test-post-test one group design. There were significant statistical differences at level (α=0.01) between means of pre-application and post-application for post application in the following social skills: Leadership skills; Participation skills; Communications skills; Team work skills. There were also significant statistical differences at level (α=0.01) between means of
Hayles and Diana (2012) in their study “The Effects of Cooperative Learning on Preschoolers’ Literacy and Social Skills” took up the research addressing the low performance rate on the Kindergarten Readiness Screener (KRS) assessment instruments for Head Start programs. Social interdependence, cognitive, social learning, and constructivist theories were chosen as the theoretical framework for this study because these theories expound on developmentally appropriate practices that encourage social and academic skills for preschoolers, and how preschoolers learn. A quantitative, quasi-experimental design was chosen to answer the key research question involving the relationships between cooperative learning and literacy and social skills for preschoolers. The sample included two classrooms of 13 preschoolers in a Head Start program. Preschoolers in the experimental group were taught using cooperative learning, while those in the control group were taught using traditional methods. The teachers administered the KRS as a pretest and post-test. Differences in preschoolers pretest and post-test scores were analyzed using the independent measures t test. Results revealed higher change scores for those who were taught using cooperative learning. Implications for positive social change include the potential to raise student skills and increase learning outcomes in Head Start programs.

Kocak and Recep (2012) in their study on “The effects of Cooperative Learning on Psychological and Social Traits among undergraduate students” took a sample of 114 freshmen and sophomores in a psychology of learning and a fundamental mathematical course, in a public university in Turkey. The University of California-Los Angeles Loneliness Scale (R-UCLA; Russell, Peplau, and Cutrona, 1980), the Toronto Alexithymia Scale (TAS; Taylor, 1984), the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1991), the Self-Monitoring Scale (SMS; Snyder, 1972), and the Happiness Scale (HS; Fordyce, 1988) were used to assess the levels of loneliness, alexithymia, social anxiety, self-monitoring, and happiness. Results show that cooperative learning was effective in reducing the levels of loneliness and social anxiety and increasing the levels of happiness among the participants.
2.2.2 REVIEW OF LITERATURE RELATED TO JIGSAW AND SOCIAL COMPETENCE

Aronson et al. (1977a) examined fifth grade students for six weeks who were organized into small interdependent cooperative groups. Students in the 10 study were compared with students in the non-cooperative classrooms. The study demonstrated that the self-esteem of students in a cooperative learning classroom increased when compared with students in non-cooperative learning classrooms. They noted that student improvements in self-esteem were the result of interacting with other students. They suggested that students who worked together received encouragement and more positive feedback from other students when working in jigsaw groups. They explained that allowing students to participate in a cooperative learning/jigsaw environment made students feel important, and they took a significant role in their learning process when compared to a non-cooperative classroom.

Aronson et al. (1977 b) examined 304 students in 13 classes from seven different schools. They indicated that 245 students were in an experimental cooperative jigsaw group with 59 in a non-cooperative control group. The results of this study indicated that students in the jigsaw classroom increased in their acceptance of classmates. They agreed that students working together were more likely to accept classmates in Jigsaw groups.

Aronson et al. (1977 c) indicated that students in the cooperative learning/jigsaw classrooms became less competitive while the non-cooperative classroom students became more competitive. In theory a cooperative classroom helped to promote social skills for students whereas a competitive classroom did not promote social skills. The jigsaw strategy promoted cooperation within groups and group members learned from each other. This study indicated that students who worked in the jigsaw classrooms were less likely to be competitive in nature as opposed to a non-cooperative individualized classroom.

Aronson et al. (1977 d) examined fifth grade students for six weeks who were organized into small interdependent cooperative groups. Students in the study were compared with students in the non-cooperative classrooms. The study demonstrated that the self-esteem of students in a cooperative learning classroom increased when
compared with students in non-cooperative learning classrooms. They noted that student improvements in self-esteem were the result of interacting with other students.

Aronson et al. (1978) indicated that often students in non-cooperative classrooms became bored with the process of learning and consequently disliked school. This was evident in the research when at the end of a six week study, students were administered a test on their liking of school. They noted that students in the jigsaw classroom liked school just as much as they had before the study. This study indicated that when students worked together in a jigsaw classroom the interaction among students and teachers had a positive benefit of increased satisfaction with school. Improved Inter-Group Relations A further benefit of the jigsaw strategy was improvement in inter-group relations among students with regard to race, ethnicity, gender, and cultural differences.

Geffener (1978) investigated the attitudes of 5th graders about themselves, school, and other students. He worked in the Santa Cruz County, California school district which had a ratio of 50% Caucasian students and 50% Hispanic students. He looked at classes that were taught in the traditional manner, those that used the jigsaw technique, and those that used a cooperative technique that did not rely on interdependence. He used a modified version of the questionnaire used by Blaney, et al., 1977, and a modified version of the Pictorial Concept Scale for Children. This modified self-concept scale uses cartoon-like pictures (stick figure) in various situations including five dimensions of self-esteem (athletic abilities, scholastic abilities, physical appearance, family interactions, and social interactions). These measures were used as pre-intervention and post-intervention measures. Interventions lasted 8 weeks. Students in the cooperative and jigsaw classes improved or maintained their positive attitudes about themselves, school, peers, and academic abilities. Students in the traditional classroom demonstrated a decline in their attitudes about peers, themselves, and academic abilities. Those in the interdependent or jigsaw technique improved or maintained levels in levels of self-esteem. While in the traditional classroom, declines were seen in self-esteem. In the jigsaw classroom, students improved their self-image in social interactions, scholastic abilities which generalized to increased confidence in their family interactions and athletic abilities.
Slavin (1980) examined 28 field projects where students were in a cooperative learning environment. He explained that students who worked together and utilized one another as a source of information experienced higher self-esteem. In addition, Slavin (1980) stated that jigsaw groups improved the students' perspective of one another and increased students' teamwork skills in the classroom. He also supported the use of cooperative learning for the promotion of higher self-esteem among students.

Bridgeman (1981) demonstrated that children in the jigsaw classroom were better able to put themselves in other’s shoe as compared to children in a traditional classroom. He concluded that one by-product of using the jigsaw classroom technique is sharpening of children’s empathy.

Walker and Crogan (1988) examined the effects of a cooperative learning environment and a Jigsaw classroom on academic performance, self-esteem, liking of school, liking of peers, and racial prejudice. They sample of the study was 103 students in grades 4–6 at two separate schools (private and public). At the private school, there was a cooperative learning program in one class with another class serving as a control group. The public school there was a genuine Jigsaw program in one class and another class serving as a control. In the experimental classes, students were divided into Jigsaw groups by their teacher in a way that ethnicity, academic ability and sex were distributed evenly within and across group. Groups did not include best friends or worse enemies. Prior to implementation, students in the experimental classes familiarized themselves with their group peers, practiced their roles as peer tutors, and practiced relevant skills like discussing main ideas, reading for meaning, listening, and quizzing peers on important information. At the private school, students in the experimental class received the cooperative learning program for 90 minutes each day, twice a week, for four weeks. At the public school, students in the experimental class received the Jigsaw program for an hour a day, five days a week, for three weeks. The jigsaw technique was implemented following standard protocol. Measures were taken pre and post intervention. Academic performance data was available only from the public school and not the private school although it had been promised from both. Students were given the Piers-Harris Children’s Self-concept Scale (CSCS) in order to measure self-esteem. Sociometric class survey data
was taken by asking students to rate their classmates according to how much they would like to work them and play with them. Racial prejudice measures were also taken in order to assess students' attitudes to Asians, Aborigines, and European-Australians. There was a measure of social distance and one of stereotypes. Findings of the study were: There was an improvement seen in academic performance for those in the Jigsaw group. There was an increase in self-esteem in the experimental groups at both schools as compared to the control groups, but the gains were not significant. This may have to do with a ceiling effect. Significant results were not seen for liking of school. Students in the Jigsaw group increased their ratings in working with peers when compared to their relative control group. When looking at individuals in the cooperative learning group, they were not motivated at the prospect of working cooperatively. There were not significant differences seen in playing with peers ratings in either experimental group. For the Jigsaw students there was an increase in work with ratings of the ethnic groups indicating that Jigsaw technique enhanced liking of in-group and out-group peers in work-orientated relationships. This was not seen for the cooperative learning students. Social distance ratings for Asian and European-Australian children decreased across the program, but European-Australian children ratings increase. In the Jigsaw group there was a decrease in negative traits attributed to Asians and European-Australians. For the private school, there was an increase in stereotyping for the cooperative learning experimental group. The study demonstrated that the Jigsaw method is effective in Australian social conditions in producing positive change in academic performance, attitudes to peers, and prejudice. Cooperative learning on the other hand produced generally negative results. Interdependence seemed to be more important than cooperation.

Slavin (1991) described inter-group relations as the idea that people who work together learn to like one another. In addition, Slavin (1987) suggested that students who worked together in jigsaw groups learned to accept one another in cooperative learning/jigsaw groups. He noted that accepting others was important especially when students of different ethnicities and races were working together to come up with solutions for a problem.

White and Frances (1991) studied the effects of two teaching methods on cross-cultural students. The experimental treatment used was Jigsaw, a form of co-
operative group learning, and the control method was whole-class lecture and
discussion. The primary purposes of the study were: (a) to determine if there were
significant differences in achievement, social relationships and co-operativeness
between students taught using the Jigsaw method and students taught using the
control method; and (b) to determine if native students would respond differently than
would non-natives to the co-operative learning approach. Results indicated there were
no significant differences in achievement and choices of friends. There was a
significant difference between the group means on the Social Behavior Scale change
scores, in favour of the control group. The findings were interpreted as suggesting that
the complex structure of the Jigsaw method worked against the development of goal-
interdependence within teams, despite a group-reward having been used.

Aronson and Patnoe (1997) noted that students who were in a jigsaw classroom for
six weeks became less competitive than students in a non-cooperative classroom. The
students learned to rely on fellow students for information and worked together for
solutions to common problems. In theory cooperative learning holds students
accountable for their learning as well as the learning of other group members. The
jigsaw strategy helped to promote social development which was a result of students
working together in cooperative groups.

Walker and Crogan (1998) study revealed that jigsaw groups decreased student’s
prejudice that existed between Asians, European-Australians, and Aborigines. They
observed 103 students in grades 4 through 6 in two different schools. One school had
31 students in a jigsaw classroom and 29 students in a non-cooperative classroom. In
the other school there were 20 students in a jigsaw classroom and 23 in a non-
cooperative classroom. They explained that students were given a post-test of six
photographs. Students rated the picture of another student they would like to play a
sport with, eat lunch with, play with on the weekend, or invite to a birthday party. The
results of their study indicated that students in jigsaw groups decreased in their dislike
towards students of different races or ethnicities. They noted that improved inter-
group relations decreased prejudice and discrimination. This study indicated that the
jigsaw strategy could enhance student’s acceptance toward other group members with
regards to race, ethnicity, gender, and differences in cultural backgrounds.
Anderson and Palmer (2001) reported that the jigsaw approach is backed by research showing it to motivate students to work together, share ideas, pursue common goals and develop self-esteem. Learning the material, being able to work in groups, and knowing how to motivate people are all positive attributes for success in the workplace. Whether it is learning material, building self-esteem or knowing how to motivate, the jigsaw can be utilized to help students.

Williams (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.

Hanze and Berger (2007) in their study “Cooperative learning, motivational effects and student characteristics: An experimental study comparing cooperative learning and direct instruction in 12th grade physics classes” experimented on a sample of 137 students in 12th grade physics classes. It was quasi-experimental study in which jigsaw classroom method of cooperative instruction was compared 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 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. Increases in feelings of competence with cooperative learning were associated with better performance in physics.

Bratt (2008) conducted study on adolescents in grades 8 to 10, using pre- and post-measurements. The study was conducted in 11 participating school classes using Jigsaw and 11 matched control classes. Jigsaw teachers were well trained and repeatedly had meetings during the eight weeks of using the Jigsaw technique. The analysis focused on the 264 ethnic Norwegian students in the 22 classes. The results of the study failed to indicate effects of Jigsaw on investigated variables: intergroup attitudes, cross-group friendship, common in-group identity, empathy, and attitudes.
toward school. These variables were measured before using Jigsaw, right after the eight weeks of Jigsaw use and finally six months after the first measure. Bratt concluded that his findings were not able to support his initial optimism on behalf of Jigsaw. Bratt also pointed out methodological limitations in previous studies on Jigsaw.

Oludipe and Awokoy (2010) examined students’ anxiety level in relation to participation in chemistry class. Students were divided into two groups; one in a cooperative learning classroom that used jigsaw approach and other using a traditional lecture method. The results shows that students in jigsaw classroom had lower levels of anxiety due to the positive interdependence attribute of jigsaw method. Positive interdependence allows students to see the success is dependent on their effort and the contributions of the group. They concluded that students “became more confident and felt secure participating actively in chemistry lessons” The jigsaw method also provides a way to help students become active in classroom activities or lessons. When students are anxious or sometime even afraid to contribute, they are going to miss information that is needed to fully understand the material. The jigsaw allows students to work with one another and develop a sense of being needed. When students are needed by their peers, they are less anxious to become involved in future activities. It can also be used early in the school year to help students get to know one another, as it is useful for social skill development as well.

Mendguo and Xiaoling (2010) concluded that The Jigsaw classroom reduces students’ reluctance and anxiety to participate in the classroom activities while increasing self esteem and self confidence “this is important to learn at the high school level because students are preparing for their future and need to learn how to participate in group activities.

Efe and Efe (2011) analyzed how students assigned as group leader in the jigsaw helped to motivate rest of the group. Results suggested that when given the title of group leader students worked to motivate other students to complete their work. Education is not learn content matter in different subjects viz social science, math, science and language etc, it is also about learning how to interact in society and be a productive citizen. In addition to helping students learn new material, the jigsaw help build social skills.
Crone and Portillo (2013) conducted a study to explore whether the jigsaw classroom would have an effect on students' attitudes about their own academic abilities and practices at the university level. The present study also sought to illuminate the necessary time course for the technique. Three sections of students in a cognitive psychology course participated. One section received a full jigsaw exposure, one received a reduced jigsaw exposure, and one received no jigsaw exposure. Posttests reveal that students given the full jigsaw exposure report an increased ability to teach psychological concepts to other students compared to the control condition. Moreover, there is evidence that the jigsaw technique increases the students’ ability to communicate orally and their belief in them as scholars.

Marhamah and Mulyad (2013) conducted a study focused on investigating the effect of jigsaw cooperative learning instruction on the second-year undergraduates’ achievement of Teaching Learning Strategy. Undergraduates’ opinions about jigsaw cooperative learning instruction were also investigated. The participants of this study were 52 second-year undergraduates in Islamic education department in Islamic University of Jakarta, Indonesia. A pre-test was applied to both experimental (N=28) and control groups (N=24) before the treatment in order to identify undergraduates' prior knowledge about “Teaching Learning Strategy” and to determine if there was a significant change in Teaching Learning Strategy from pre-test to post-test for second-year undergraduates. Independent t-test was conducted to compare the prior knowledge test scores for groups and no significant difference was found in terms of mean scores. After the instruction, post-test was administrated to investigate undergraduates' achievement. The results showed that students in the experimental group, who perceived their instruction as more cooperative and more student-centered, had significantly greater improvement on achievement measures than did the students in the control group. In addition, individual interviews reflected that undergraduates had positive opinion about jigsaw, and they believed jigsaw is an effective cooperative learning technique that promotes positive attitudes and interest develop inter-personal skills. The major findings of this study support the effectiveness of jigsaw learning for students in Indonesia higher education institutions.
2.2.3 SUMMARY OF REVIEWS RELATED TO SOCIAL COMPETENCE

Review of literature revealed that cooperative learning has significant effect on different dimensions of social competence as measured by different tests (Lickona, 1991; Nowak, 1996; Lucas, 1999; Tripathy, 2004; Thakur, 2006; Aronson and Patnoe; Sharma and Sharma, 2008; Gillies, 2008; Ebrahim, 2010; Shimazoe and Aldrich, 2010; Leung, 2012).

Implementation of Cooperative learning has shown significant effect on improving Social skills (Jordan and Metais, 1997; Early, 1999; Veenman et al., 2000; Goudas and Magotsiou, 2006; Klimoviene and Statkeviciene, 2006; Shimazoe and Aldrich, 2010; Mohseen and Fauzee, 2011; Hayles and Diana, 2012; Al-Semairi, 2012). Cooperative learning also improves Interpersonal relationships (Sharma and Sharma, 2008); Decrease levels of loneliness, social anxiety and increases the levels of happiness (Kocak and Recep, 2012), student acceptance toward other group and decrease prejudice (Walker and Crogan, 1998), makes students more cooperative and helpful to each other (Gillies, 2002; Pahuja and Kaur, 2006; Gillies, 2008; Bertucci et al., 2010) reported positive results on other social variables (McManus and Gettinger, Nowak, 1996; Fantuzzo et al., 2006, Hanze and Berger, 2007). Child’s Social-emotional, cognitive and academic development is affected by his social experiences with peers and adults (Kinsey, 2000). Cooperative learning has positive effect on self esteem (Johnson et al., 1978; Slavin, 1980; Ali, 1999; Veenman et al., 2000; Kalaiyarasan and Krishnaraj, 2004; Tripathy, 2004, Bertucci et al., 2010). Some studies have reported that learning through Jigsaw method of cooperative learning has significant effect on many social variables viz social skills (Aronson et al., 1977 b); self-esteem (Aronson et al., 1977 c; Walker and Crogan, 1988; Anderson and Palmer, 2001); acceptance of classmates (Aronson et al., 1977a; Slavin, 1991); attitude toward Peer’s, (Walker and Crogan, 1988); children’s empathy (Bridgeman, 1981); Social development (Aronson and Patnoe, 1997) Intergroup relations (Aronson et al., 1978); reduces discrimination, (Williams, 2004); positive attitudes about learning (Wang, 2006). Very few studies reported no significant effect of Jigsaw on Social competence (White and France, 1991; Bratt, 2008).
Cooperative learning has also shown positive results on group interaction and attitude toward group/ cooperative learning (Skon, 1979; Webb, 1982; Hooper et al., 1993; Kinny, 1989; Veenman et al., 2000; Tripathy, 2004); Social relations (Lickona, 1991); Self efficacy (Chang, 1998); Liking of other ethnic groups and peer support (Slavin, 1978, Cooper et al., 1980; Tripathy, 2004); race relation by working in groups (Slavin and Madden, 1979) increased number of friends and self confidence (Nederhood, 1986); Reduction of Anxiety level (Okebukola, 1986). Meta-analysis of different studies on cooperative learning has reported positive effects in all major subjects, all grade level, in urban and suburban schools and for high, average and low achievers. (Slavin, 1991 (67 studies) and Johnson et al., 2000 (158 studies)). Peer relationship is great contributor in social and cognitive development (Hartup, 1992) and peer learning is related to classroom achievement (Wentzel and Caldwell, 2002). Awareness training Model caused improvement on social skills (Bhandari, 2011). Students in cooperative learning groups showed, increase in number of friends, liking of others (Slavin, 1980 and Nederhood, 1986; Whicker, 1997), Increase in interactive behaviours (Nowak, 1996; McManus and Gettinger, 1996) increase in group effectiveness and interpersonal interactions (Earley, 1999). Peer orientation resulted into significantly more motivation to learn (Hancock, 2004), Increase in self-confidence (Nederhood, 1986), 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). Review of literatures reveals that there is inconsistency of results of social competence in relation to gender. One study reported boys were more social as compared to girls (Dhanda et al. 2008; and one reported no significant difference between male and female (Yadav and Singh, 2011). In small group gender interaction, female experienced detrimental to achievement (Webb, 1984).

Theoretical basis of cooperative learning and research studies have supported many social benefit of cooperative learning. Most of the above cited research work is done on foreign soil. A few studies (Kalaiyarasan and Krishnaraj, 2004; Tripathy, 2004; Pahuja and Kaur, 2006; Sharma and Sharma, 2008; Chabra and Tabassum, 2010; Pushpanjali and Satyaprakash, 2010; Chopra and Gupta, 2013) are conducted to see the effect of cooperative learning methods on social variables in Indian conditions.
2.3 REVIEW OF LITERATURE RELATED TO COOPERATIVE LEARNING AND ACHIEVEMENT (Different Subjects)

Johnson and Ahlgren (1976) examined the relationships between students' attitudes toward cooperation, competition, and their attitudes toward education. The results of the study indicated that student cooperativeness, and not competitiveness, was positively related to being motivated to learn.

Anderson et. al. (1976) conducted research on 30 fifth graders to know the effects of structuring classroom learning cooperatively and individualistically on student's ability to appreciate the effective perspective of other's altruism, attitudes towards classroom life and achievement. The students were matched on previous achievements 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 effective perspective of others for more altruism, more positive attitude towards classroom life and higher achievement.

Tjosvold et al. (1977) found that cooperative learning strategies promoted positive attitudes toward both didactic and inquiry methods of teaching science, and students taught by cooperative strategies believed they had learned more from the lesson than did students taught by competitive strategies.

Sharan et al. (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.
Skon (1979) compared the effects of cooperative, competitive and individualistic learning situations on student's achievements 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 the 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 whereas in case of competitive condition, high ability students maintained slightly poorer that the low ability students. Subjects in the cooperative condition perceived greater peer support than did subjects in competitive and individualistic situations.

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 instructions. 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. The reward effect was in favour of team reward and the task effect was in favour of the individual task. No effects were found for standardized effect; (2) The experimental classes learned significantly more than the comparison classes due to focused schedule of instruction; (3) Students in team reward conditions were found to be on-task significantly more than in the individual reward conditions. Students tutored significantly more in the team reward classes than they did in the individual reward class.

Wodarski et al. (1980) in a review of 46 studies related to cooperative learning found significant gains between the pretest and posttest scores. The researchers concluded that cooperative learning was an effective method of teaching nutrition.

Johnson et al. (1981) conducted a meta-analysis of 122 studies related to cooperative learning and concluded that there was strong evidence for the superiority of
cooperative learning in promoting achievement over competitive and individualistic strategies.

Humphreys et al. (1982) compared cooperative, competitive, and individualistic strategies in science classes and found that students who were taught by cooperative learning methods learned and retained significantly more information than students taught by the other two methods.

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.

Lang (1983) in his study “The effects of a cooperative learning technique, Teams-Games-Tournament, on the academic achievement and attitude toward economics of college students enrolled in a principles of microeconomics course” reported that use of a cooperative learning technique, Teams-Games-Tournament (TGT), would increase academic achievement and improve attitude toward economics among college students enrolled in a principles of microeconomics course more than the conventional lecture-discussion method. The study utilized the posttest-only control group design. Sixty students in one intact principles of microeconomics class were randomly assigned to the control (conventional lecture-discussion) group or the experimental (TGT) group; 30 students in each group. Tests to determine the equivalence of the treatment groups indicated that the two groups did not differ. During the 10-week quarter, all students met together for four consecutive class periods of lectures. During the fifth day of the sequence, the class divided into two groups. The TGT group participated in team study and competition. The control group used the same study materials on an individual basis to more nearly simulate the lecture-discussion method. The achievement variable was measured by a 50-item modified version of the Test of Understanding College Economics, which had a
reliability of .64 (Cronbach alpha). Attitude toward economics was measured by a 20-statement Likert-new survey, Survey of attitude toward economics, which had a reliability of .96 (Cronbach alpha). It was found that TGT had no statistically significant treatment effect on academic achievement nor were there any statistically significant distributional effects of TGT among students in three ability groups. Regarding attitude toward economics, TGT had no statistically significant treatment or distributional effects. An interesting non statistical comparison of ability group means indicated that the TGT-low group had a mean attitude score 13.93 points higher than the Control-low group. The lack of TGT treatment effects might be due in part to the small sample size resulting in too few students in each ability group and unequal cell frequencies. Subsequent research might provide sufficient evidence on the usefulness of TGT in college economics.

Perrault (1983) in a study in which nutrition was taught to both elementary and secondary students using a cooperative learning strategy found that cooperative learning resulted in significantly higher achievement in industrial arts students at the knowledge and comprehension levels of Bloom's taxonomy, but not at the application level when compared to students taught by competitive methods.

Slavin (1983) in a survey of 46 studies found that cooperative learning resulted in significant positive effects in 63% of the studies, and only two studies reported higher achievement for the comparison group.

Webb (1984) investigated in 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 compared to other high-medium-low ability groups), the males and female had 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 females’ 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.
Allen and Van Sickle (1984) used STAD as the experimental treatment in a study involving low achieving students. They found that the cooperative learning group scored significantly higher on a world geography test.

Okebukola (1986) conducted an experiment on Nigerian students of chemistry (with mean age of 13.2 years). The sample was selected from two secondary schools in Ilesa, Nigeria and pretest posttest two group design was used. The experimental group having 109 students was taught using cooperative learning method while the control group having 114 students was taught using traditional whole-class method with accompanying teacher demonstration. The data were analyzed using analysis of covariance. It was found that students’ performance in chemistry was greater for experimental group that was taught through cooperative learning method.

Scanlan (1988) examined the patterns of student talk in one fifth grade mathematics class. Cooperating learning groups provide 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 group 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 processes; 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 way in which the students used oral language.

Watson (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 packets designed for use with groups of high school biology students. Cooperative learning is classroom learning environment in which students work in small, mixed ability groups toward a common goal and are rewarded for doing well as a group. A total of 11 teachers with 36 classes and 175 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 differences were found in the achievement of student using GEM materials and those using traditional instructional approaches. The use of cooperative learning produced significant differences 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 tests on the third day. Day one involved the use of STAD. One day, two students were given their graded tests 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. Both black and white students in the experimental group had significant increase on chapter test scores.

**Lickona (1991)** two year study of a Cooperative Elementary School Model involved 2 treatment schools, 3 comparison schools, and 102 students. Findings indicated positive effects on academic achievement and social relations after the cooperative learning model was implemented. Cooperative learning helps to teach children that they can do more together than they can do alone.

**Orlando (1991)** conducted a study on Cooperative learning, student achievement and attitude in community college freshman English classes. Cooperative learning method, STAD 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 students’ attitude towards cooperative learning instructions indicated a positive direction.

**Slavin (1991)** in his review of 67 studies, 61% of the cooperative-learning classes achieved significantly higher test scores than the traditional classes. Positive effects were found in all major subjects, all grade level, in urban and suburban schools and for high, average and low achievers. He notes that the difference between the more
and less effective cooperative-learning classes was that the effective ones stressed group goals and individual accountability.

Bak (1993) worked on meta-analytic integration of the relationship between cooperative 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 it 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.

Hooper et al. (1993) conducted a study on “The effects of cooperative learning and learner control on high- and average-ability students”. In the present study, a total of fourth grade students were classified as being of high and/or average ability and randomly assigned to paired or individual treatments stratified by ability. Following cooperative learning, students demonstrated increased achievement and efficiency as well as better attitudes towards grouping.

Zisk (1993) conducted a study on the effects of a cooperative learning program on the academic self-concept of high school chemistry students in Temple University. The two types of academic self-concept, performance based and reference based, as measured by the SAM instrument and found that students’ sense of academic self-concept is significantly greater after exposure to cooperative learning teaching strategies when compared to a ‘traditional’ teaching strategy. Furthermore, an
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 toward science class. The process skills were not influenced by the instructional strategy. Response 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 favourable by seventh class science students, who found that it improved their perceptions of science, made science learning more fun and improved their learning.

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

Hopp (1994) examined the influence of task on time spent in cooperative episodes and on cognitive and meta-cognitive behaviours of 32 eighth graders 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 video-taping all students interactions as they completed the tasks. Findings suggested that time spent in cooperative episodes was related to the type of task and task may influence the quality of interactions as evidenced by problem-solving behaviours. Differences in 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.

Stevens and Slavin (1995) study was done over a period of two years to determine the effects of cooperative learning on student achievement, attitude, and Metacognitive awareness. This was done by using a cooperative learning approach to reading and language instruction. Second through sixth grade mainstreamed, academically handicapped students worked in heterogeneous learning teams on reading and writing activities. The results of this study favored the cooperative learning program over the regular instruction and pull-out remedial programs because of the improvement in student achievement, attitude, and Meta cognitive awareness.

Zhining et al. (1995) concluded that students of all age levels (elementary, secondary, college, adult) who worked cooperatively outscored students who worked competitively. The average student in a cooperative group solved more problems correctly than 71 percent of the students who worked competitively.

Esdaille et al. (1996) in his study “The effect of cooperative learning on the problem-solving skills among managerial accounting students” in University of Washington’ investigated the relationship between styles of teaching and the problem solving abilities of two groups of managerial accounting students over a period of six weeks.
Cooperative groups were created in one section of the managerial accounting course, while the other group was taught in the conventional manner. At the end of both the third and the sixth week of the study, a set of accounting problems was given to each student and their scores were analyzed by generalized multiple regression to identify any correlation between students' problem solving skills and teaching style, gender, grade in first accounting course, and cumulative grade point average at the end of the quarter immediately preceding taking the course. The scores were also analyzed to detect interactions between teaching style and both gender and cumulative grade point average. Although, the principal method of analysis was multiple regressions, the scores were also analyzed by ANOVA for comparison with the multiple regression results. The regression analysis produced relatively high coefficients of determination (R²/sp2). The study discovered that cumulative grade point average, gender, and the cooperative group model of teaching the course were all at varying degrees and at different times during the study, important in explaining the variability in the problem solving scores of students. One key finding was that males benefited more from the cooperative method of teaching than females. Not surprisingly, ANOVA confirmed the multiple regression results. The result was consistent with the prevailing research on the positive effects of cooperative learning on students' achievement in other disciplines; but so far, this study is the only one in the accounting field that indicated such positive correlation.

Lynch (1996) conducted a study on the effects of cooperative learning on the academic self-concept and academic achievement in Columbia University. In this study the sample was a group (N = 63) of 17- to 23-year-old inner-city alternative high school students in New York City. Data were obtained through students' responses on self-report questionnaires. Two types of sequential equation modeling, path analysis and EQS, were used to test the hypotheses. The results of both analyses confirmed the predicted relationships between cooperative learning and academic achievement.

Nowak (1996) explored the effects of a cooperative learning programme on academic performance, cooperative interactions during lessons, and pro-social behaviors during play activities in integrated kindergarten classrooms. Scores on curriculum based mathematics probes and direct observations of cooperative interactions during the
intervention served as primary dependent measures. 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. Social validity data suggested that teachers, students and parent found the cooperative learning procedure to be effective and acceptable.

**Jabr (1996)** in his study “The Effect of Cooperative Learning in English Language on Ninth Grade Students’ Attitudes and Academic Achievement at UNRWA Schools in Nablus District” in which the sample of the study consisted of (138) male and female students in the ninth grade at two schools belonging to UNRWA in the Nablus area during the scholastic year (1995-1996). The sample of the study was randomly selected. There was a significant difference in the students’ achievement (males and females) of English due to the teaching method for the benefit of the experimental group. There was significant difference in the boys’ achievement and girls’ achievement.

**Abu and Flowers (1997)** in their study “The Effects of Co-operative Learning Methods on Achievement, Retention and Attitudes of Home Economics Students in North Carolina” found no significant difference among the dependent variables (achievement and retention) between the teaching methods used.

**Whicker (1997)** investigated the effects of cooperative learning on student achievement and attitudes on the mathematics students of secondary class. One group studied in cooperative learning group and another group studied the material independently. Results revealed that students in the cooperative learning group had increasingly higher test scores than students in the comparison group and survey 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 concepts.

**Walker and Crogan (1998)** examined over 100 students from two different schools. These schools included a cooperative learning school and a non-cooperative learning school in a rural setting in Australia. They noted that the two schools were ethnically diverse with Asians, European-Australians, and Aborigines who worked in
cooperative learning groups and non-cooperative individualized settings. In a four week study the students from both schools were administered a pre-test and a post-test. The study revealed that academic achievement improved for students from different ethnicities in the cooperative learning school compared to those in the non-cooperative school.

**Lucas (1999)** studied the effects on the use of cooperative learning on the academic performance and self-efficacy of students controlled 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.

**Jensen et al. (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.

**Singh and Rai (2002)** studied on the topic “Cooperative Learning- an Innovation Learning Strategy. The study explains that teachers can increase their pupils’ performance on academic tasks if they have their pupils work on the tasks in groups of 2 to 7 under rules by which the pupils teach each other, coach each other and succeed as a group and if their teachers show them how to do and think about these things, and if they are rewarded individually and as a group, for doing them. The future of cooperative learning is rich in possibilities.
Vaughan (2002) examined the effects of cooperative learning on the achievement and attitudes towards mathematics of a group of 5th grade students of color 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 color.

Bibi (2003) in her study “The Comparative Effectiveness of Teaching English Grammar with the help of Text book and by using Group work activities” the sample size was eighty (80) at the secondary and one hundred and twelve (112) at the elementary stage. Duration of teaching was about one month with daily period of thirty five minutes at each stage. The experimental and control groups at both the elementary and secondary stage were equivalent at the time of starting the experiment. Teaching of English Grammar through group work activities (inductive approach) played a positive role in improving the academic achievement of the students studying English at the elementary as well as the secondary stage.

Sasidharan (2003) conducted a study on Influence of instructional learning strategies and classroom environment on achievement and retention in Malayalam language of standard VII pupils. The study consist 100 pupils from two schools of Palakkad district selected randomly. Pre test Post test equivalent groups design was applied. Statistical techniques T-test, Anova, Ancova were computed. The findings of the study were that classroom interaction was higher in the cooperative learning classroom than in the conventional classroom, the cooperative learning groups (Jigsaw II) group obtained higher mean scores on achievement and retention as compare to conventional and there exist significant difference between cooperative learning groups and conventional group with regard to achievement when the effect of the covariates were controlled.

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.

**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 of 52 graduate students 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 percent of the participants were women. During 15 weekly lessons (2 hr and 50 min each), subjects were exposed to cooperative learning instructions that involved face to face promotive interaction, positive interdependence, individual accountability enforced 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.

**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
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 peer 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.

Barkley et al. (2005) in extensive meta-analysis across hundreds of studies found cooperative arrangements were superior to either competitive or individualistic structures on a variety of outcome measures, generally showing higher achievement, higher-level reasoning, more frequent generation of new ideas and solutions, and greater transfer of what is learned from one situation to another.

Chen (2005) conducted a study on “Cooperative Learning, Multiple Intelligences and Proficiency: application in college English language teaching and learning” in which the subjects were from the researcher’s three English classes at Chung Hwa Institute of Medical Technology during one semester. Many learning activities based on Gardner’s theory of Multiple Intelligences were used while a Cooperative Learning approach was practiced. The results of the study showed that the experimental group that was taught using the ideas based on CL and Multiple Intelligences outperformed the group based on CL, and the control group, on the Simulate English General Proficiency tests for the four language skills.

Dienno and Hilton (2005) compared two teaching methods (constructivist vs. traditional approach) on high school students attitude and knowledge of non native plants and found that knowledge and attitude of students experiencing a constructivist approach significantly increase, noting the benefit to helping students gain skill
needed for informed decision making while no similar trends was found for the group with traditional approach.

**Patnaik and Prakash (2005)** in their study found that cooperative learning (Learning Together) has a positive effect on achievement in Biology in term of Knowledge, understanding and application objective as well as total. The positive aspect of cooperative learning such as positive interaction among students, explaining concepts and generalization and giving examples to another, involving in reasoning, informing and divergent thinking etc. has helped the students to achieve better in biology.

**Singh (2005)** conducted an experiment on 220 8th grade students to examine the effectiveness of cooperative learning on science achievement in Indian context. A quasi experimental design was used by the investigator. Two classes- one of 40 boys and another of 65 girls – served as experimental groups, while two classes- one of 51 boys and another of 64 girls –served as control group. The students in experimental groups were taught using STAD method of cooperative learning, while traditional teaching method was used to teach the students in control groups. The experiment lasted for 32 working days and the same content was taught to all the groups. The data was analyzed using analysis of covariance and superiority of cooperative learning to traditional method was found in term of science achievement.

**Dikici and Yavuzer (2006)** in their study “the effects of cooperative learning on the abilities of pre-service art teacher candidates to lesson planning in turkey”, applied Cooperative learning method to the experimental group, and traditional learning method was applied to the control group. The candidates of both groups were requested to focus on planning a lesson. The results of the research shown that there was no significant difference between the pre-test points (P>.05), however, there was a significant difference between the post-test points in favor of the experimental group (P<.05).

**Hemamalini and Yeshodhara (2006)** conducted a study on Impact of a learner centric approach on the achievement level of using auxiliary verbs among the students of 8th standard. The study was experimental in nature. A two group (experimental and control group) post test only deign was applied. The experimental group was taught through learner centric approach and control group was taught through traditional approach. The purposive sampling technique was used to select the sample. They
reported that learner centered approach proved to be effective as the difference between the means of experimental group and control group was significant ($t=3.48$). There was no significant difference found between boys and girls in the level of achievement on the test auxiliary verbs.

Thakur (2006) investigated the effects of cooperative learning techniques on achievement of 200 7th grade students in 14 experimental teams of Chandigarh school. The result of the study was significant and positive; linking a teacher’s use of student team learning with positive classroom environment increased number of friends, higher academic expectations and increased self confidence. It clearly shows that cooperative learning technique is an effective method of increasing achievement level of 7th graders in Mathematics.

Thangarajathi and Viola (2007) conducted a study on cooperative learning approach in learning mathematics, the objectives of the study were to find out the effectiveness of cooperative learning approach over conventional method in learning mathematics at high school level (ii) to compare the achievement of high, average and low achievers when taught through cooperative learning method (iii) to compare the achievement of high, average and low achievers when taught through conventional method (iv) to find out and compare conventional method group and cooperative learning group with respect to sex, locality of house, tuition undergone, type of tuition. Equivalent group experimental design was used. Sampling technique was convenient sampling, a sample of 48 students studying in class 9th of both sexes were taken from 2 schools of tuticorin district. 24 students were selected from each school. Lesson transcripts based on cooperative learning approach on mathematics were used for data collection. T-test and F ratios were used. They reported that there is significant difference between the pre test and post Test scores of group with respect to sex, locality; tuition undergone and type of tuition.

Ahmad (2008) conducted a study on “Effect of Cooperative Learning on students’ achievement at Elementary level” In this study students of class 6th equally divided on the basis of teacher made pre-test scores and a treatment cooperative learning method “Student Team Achievement Division (STAD)” was provided to experimental group, control group was taught by using traditional method of teaching and kept under traditional classroom situation for the period of 12 weeks. The comparative
effectiveness of cooperative learning on high and low achievers was measured. Result of the study indicates that cooperative learning is more effective teaching method as compared to traditional methods of teaching.

Alharbi (2008) studied the effectiveness of using cooperative learning method on ESL reading comprehension performance, students' attitudes toward CL, and students' motivation toward reading of secondary stage in Saudi public girls' schools. This study investigated the effects of the use of cooperative learning method in English as a second language reading comprehension performance and how it improves the students' second language, their attitudes toward cooperative learning, and their motivation toward reading. Sixty ESL Saudi high school students from The Third Secondary School in Arrass City participated in this study and were divided into two groups (experimental group vs. control group). A pretest-posttest control group design was employed. Data were analyzed using a one-way analysis of covariance (ANCOVA) to test the differences between the experimental and the comparison group. The results of this analysis showed there was no significant difference between experimental and comparison groups in the level of students' motivation toward reading. There were significant differences between the two groups in the reading comprehension performance and in students' attitudes toward cooperative learning, which favored the experimental group.

George (2008) conducted a study on “Effectiveness of cooperative Learning over Conventional Lecture Method” on a sample of 72 student teachers studying in three Primary Teacher Training Institutes of Kottayam Direct, Kerela. Due care was given to representation of factors like locale, sex, and type of management. Achievement Test, Co-operative Learning Package and Delayed Memory Achievement Test were applied. The sample was divided into two groups namely the experimental group and the control group. Both the group were pre-tested with the achievement test prepared by the investigator. Student teachers in the experimental group used co-operative learning as the instructional strategy. In the control group, the investigator herself presented the lessons and made conceptual analysis of the content using the lecture method. In order to compare the retention of student teachers on the topics already learned, a delayed memory achievement test was administered to the experimental group. It was further found that instruction using the co-operative learning method is more effective than the conventional achievement of primary level student teachers.
**Kaul (2008)** conducted a study on “The Effect of Learning Together Techniques of Cooperative Learning Method on Students’ Achievement in Mathematics”. In this study, pretest posttest design with control group was applied. The study was conducted on 70 pupils studying in 7th class in N. S. Public School, Gamma II, Greater Noida, Uttar Pradesh. In this study, Experimental and control group have been used. Learning Together Technique of Cooperative Learning Method has been applied to the experimental group and traditional teaching method has been applied to the control group. Conclusions show that there is a significant difference between the results of experimental and control groups. Learning together technique of cooperative learning method is more effective than traditional teaching methods.

**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.

**Chester (2009)** studied the relationship between cooperative learning and physics achievement in minority students. The purpose of study was to investigate the impact of cooperative learning strategy on physics achievement by high school minority students. Constructivism formed the theoretical framework for the study. Independent learning, the traditional strategy, and cooperative learning dyads, the novel intervention, were the independent variables, and the dependent variable was achievement in physics. A repeated measures design and a convenient sample group
of students were used in this study. Difference of scores obtained from the performances of the group as independent and cooperative learners was subjected to a repeated measures t test. A significant relationship between cooperative learning and physics achievement by high school minority students was found. By learning in small groups, students were able to help each other construct meaning and make sense of their learning. Further study was recommended to foster cooperative learning strategy in minority classes and among science teachers of high schools with a majority of minorities.

Kishore (2009) conducted a study to know the effectiveness of cooperative learning methods on achievement, retention, emotional intelligence and social acceptability. Secondary level science students from hindi medium schools were the population of the study. Sixty 9th grade male students (20 each in three intact classes) were selected for the sample. Science achievement test scores of three groups (STAD, LT and TTM) were compared using ANCOVA treating pretest scores as covariate. The finding of the study clearly revealed that STAD and LT both were more effective to teach science as compare to traditional method (TTM) but STAD and LT methods of cooperative learning do not differ significantly in term of effectiveness on achievement of students in science.

Badhe (2010) in her study “Teaching ‘Image Formation’ through cooperative learning method” in which sample of 45 students of one division of D.Ed. College was taken. As all the students showed improvement in quantitative as well as qualitative evaluation, the use of work cards and cooperative learning method are effective for teaching the topic ‘Image Formation’ to the students of D.Ed. College of Pune. Majority of the students showed positive responses towards cooperative learning method and the use of work cards. There was an improvement in the students of all streams.

Behlol (2010) conducted a study to “Develop and Validate Module in English at Secondary level in Pakistan”. Objectives of the study were: (a) To develop a sample module from the textbook of English for the 9th class. (b) To validate a module determining their effectiveness by teaching in the classroom. (c) To validate module determining their effectiveness from the performance of low and high achievers in the classroom. Therefore, the researcher developed a Module consisting of six units on
the first five lessons of the textbook of 9th class. The module was validated by conducting lessons in the classroom with its help. Therefore, the Pre-test Posttest were used as the instruments of the study. The Pre-test was used to find out the competencies of the students to deal with the material presented in the module. The validation of the module was checked by administering the same pretest as a post-test to the subjects of both experimental and control groups by changing the arrangement of the items on the pattern of “Even Odd Numbers”. The module consisting of six units were taught in 14 weeks and it consumed 80 hours of the students for solving the activities given at the end of the module. The students of secondary classes studying in Government public secondary schools were the population of study. The control group as well as the experimental group was of equal size, each having 30 students of 9th class. The scores of pre-test and post-test were the data of study. The significance of difference between the scores of groups at 0.05 levels was tested by applying t-test and analysis of variance. The study proved that the material designed as a module promoted independent learning habits in the learner, provided opportunity to proceed at his own pace, ensured active participation, useful for slow as well as of bright students, enabled the students to comprehend difficult concepts, and kept them on the track.

**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.

**Shimazoe and Aldrich (2010)** in their study discussed several benefits on the use of cooperative learning approach for students. It promotes deep learning of materials, students achieve better grades in cooperative learning compared to competitive or individual learning, students learn social skills and civic values, students learn higher
order thinking skills, students develop positive attitudes towards autonomous learning.

**Zakaria et al. (2010)** conducted a quasi-experimental study on two classes. One class (n = 44) was assigned as an experimental group and the other (n = 38) was assigned as a control group. The two groups were pre-tested prior the implementation. At the end of the study, posttest was given, while daily quiz was used as a tool for formative testing. Teaching and learning process was carried out for two weeks. Data were analyzed using the t-test to determine performance by comparing the mean of the post test for treatment and control group. The results of this study showed that cooperative learning methods improve students’ achievement in mathematics and attitude towards mathematics.

**Melihan and Sirri (2011)** studied the effect of permutation and probability subject with cooperative learning method and traditional teaching method on the success and recall levels of 8th grade students. The model of experimental technique with pretest and posttest control group was used. Research was conducted on 64 students from two primary school in Sulakyurt district of Kirikkale province in the second semester of 2006-2007 education year. The lessons in the experiment group were treated with student teams-achievement division’s technique. The achievement test which was developed as a measuring device was applied to both two groups as pretest, posttest and permanence test. In the result of the research, it was concluded that the cooperative learning method is more effective than the traditional teaching method on the academic success and experimental group recall the subject that they learned longer time.

**Bunrasi (2012)** undertook a study “Algebra I Achievement of Eighth Grade Mexican American Students Using Cooperative Learning Versus Traditional Instruction” to examine constructivist-based algebra lessons and a cooperative construct to address the achievement gap between White (non-Hispanic) and Mexican American 8th grade students at a southern California middle school. The lessons were designed to facilitate social interdependence which promoted peer-to-peer interaction and co-dependence upon each other for the acquisition of social and logical mathematical knowledge of algebraic concepts in a cooperative setting. Vygostsky's socio cultural theory and Deutsch's social interdependence theory were chosen as theoretical
frameworks for this quantitative study. A 2×2 factorial design was employed to answer the key research questions related to a statistically significant mean difference in achievement scores on the Elementary Algebra Diagnostic (EA50A90) test between (a) cooperative learning and traditional instruction, (b) benchmark and strategic student ability levels, and (c) the results from specific interaction between the type of instructions and the student ability levels. A two-factor analysis of variance was used to analyze the EA50A90 pretest and posttest results. In the study findings, there was a statistically significant mean difference between algebra achievement scores on students’ posttest among the students who participated in constructivist-based algebra lessons using a cooperative construct and those who received traditional instruction. Social interdependence within cooperative learning group members scaffolded academic success. The results of this study contributed to social change by prompting Algebra I teachers to use a social interdependence process as a vehicle to promote improved Mexican American student achievement.

Hassan and Fook (2012) in their research aimed to investigate the impact of e-learning supported by cooperative learning on students’ achievement in the core Arabic language course delivered through the Blackboard system at Qatar University, State of Qatar. The activity theory was the basis for the design of the study which employed a 2 × 2 quasi-experimental factorial design to investigate the interaction between the independent variables of the research: e-learning supported by cooperative learning (EL + CL) and e-learning not supported by cooperative learning (EL – CL) with gender as a moderator variable and achievement in the Arabic language as a dependent variable. An achievement test was developed and administered to a sample of 170 undergraduate students (85 male and 85 Female) majoring in different subjects from seven colleges of the University over a 10-week period. Analysis of the findings by the two-way ANCOVA procedure was used to examine the three postulated hypotheses. The findings of this study showed that students assigned to the e-learning modules supported by cooperative learning (EL + CL) mode attained significantly higher adjusted mean scores on Arabic language achievement than students working on the e-learning module that were not supported by the cooperative learning (EL - CL) mode. Male students attained significantly higher adjusted mean scores on the achievement test than females using the same
modules. No significant interaction effect was detected between e-learning modes and gender on achievement.

**Huddy (2012)** conducted a meta-analytic review of cooperative learning practices in higher education and found that Cooperative learning and collaborative learning techniques differ in the amount and implementation of teaching guidelines required in the methodology. This study (a meta-analysis) weaves through more than 14-hundred published pieces of literature in a variety of disciplines, narrowing it down to 19 published articles which investigate (through experiments) the effectiveness through learning outcomes of cooperative learning in higher education (college and university level). With studies including more than 2-thousand student-participants in the research, data indicates no significant difference between those classrooms utilizing a cooperative learning format, and those using a traditional lecture/discussion format ($d = 0.05$, $95\%$, $C1:-05$ to $0.14$, $p > .05$, $k = 21$, $N = 2,052$). Though there is no statistical difference between the two teaching techniques, researchers do offer a list of positive classroom observations/variables, which provides a launching point for future research into the use of cooperative learning techniques in higher education.

**Chopra and Gupta (2013)** in their study observed the impact of constructivist approach on science achievement of $8^{th}$ standard students with the help of pre-test, treatment programme and post test on experimental and control group which were equated on the basis of intelligence and socio-economic status. The findings of the study revealed that constructivist approach had a positive impact on science achievement of $8^{th}$ standard students and there is no significant difference in the performance of boys and girls of both the groups.

### 2.3.1 REVIEW OF LITERATURE RELATED TO COOPERATIVE LEARNING AND ACHIEVEMENT IN SOCIAL SCIENCE

**Slavin and Sharan (1983)** in their study “Cooperative Learning in Social Studies Education: What Does the Research Say?” compared with other methods, cooperative learning produces greater academic learning, better inter group relations among black, white and Hispanic students, enhanced self-esteem, and improved relationships between mainstreamed academically handicapped students and normal progress students.
Dhamija (1985) studied effectiveness of three approaches of instructions namely conventional, radio-vision and modular on achievement of students in social studies (Geography, history, civics). The sample was 90 students divided into 3 groups. 3*3 factorial design was used. The findings of the study revealed that radio vision to be best suited to geography, students gained most from modular approach in civics and for history conventional approach was best as for achievement of students. Self confidence among students increased in modular approach as compared to other two.

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.

Armstrong (1997) studied the effect of Student Team Achievement Divisions (STAD) cooperative learning method on academic achievement and attitude toward 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 exhibited no statistically significant difference in academic achievement on student attitude toward social studies class.

Hameed (1997) found that cooperative learning was a better strategy than conventional method of teaching for social science. He concluded this from an experimental study, conducted on sample of 80 students of standard seven from two upper primary schools in Kerala state (India).

Punch and Moriarty (1997) investigated the effect of cooperative learning and competitive environment on achievement and found that cooperative learning environment had a significantly higher adjusted mean for achievement than competitive learning environment. In the experiment they adopted quasi experimental design and took 179 students and their seven teachers as participants. The classes
were randomly assigned to work in different environments for five weeks during their twice-weekly social study lessons. Classes then changed environment for further five weeks. The data were analyzed through regression analysis, using the results on the pretest of achievement in social science as covariate.

**Dotson (2001)** in his study on “Cooperative Learning Structures can Increase Student Achievement” took a sample of sixth graders social studies students of Dunbar Middle School in Fairmont, West Virginia and divided them into control and experimental group. The groupings involved consisted of students with varying abilities, from mentally impaired to gift. The measures were curriculum based assessments and means of each class were compared. It was concluded that students taught through cooperative learning structures scored better than those taught through traditional method of teaching.

**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.

**Ross (2002)** investigated Cooperative learning and lecture discussion methods of social studies instruction for seventh-grade low SES African-American and low SES Caucasian students for their effectiveness. This study was conducted using a quasi-experimental design in which a control group and an experimental group each of low SES African-American students and of low SES Caucasian students received lecture discussion instruction and cooperative learning instruction. The control and experimental sample populations consisted of four groups of students defined as intact classes at two different schools. The study measured academic achievement, student perceptions, and teacher perceptions while controlling for the independent variable of instructional method. The purposive sample was based on an accessible target population that met the study requirements of race and socioeconomic status. This investigation was conducted in two public schools located
in the southeastern section of the country. The schools and classes had a comparably sized seventh-grade student population and a comparable number of teachers. Each school had either a majority low SES African-American or a majority low SES Caucasian student population. Study participants were enrolled in seventh-grade regular placement social studies classes. Participants were between the ages of 12 and 14 years of age. The socioeconomic status of 90% of the participants was "lower" based upon the fact that more than 80% of the students receive free or a reduced fee lunch. The control group was instructed using the lecture discussion method; the experimental group received cooperative learning instruction. Both groups received matched instruction on the same social studies unit based upon the state-mandated social studies curriculum. The researcher and the participating teachers collaboratively designed the lesson plans for this investigation. The two groups were instructed during their regular class time for a period of five days. The findings of this study support the implications of previous research that indicates that African-American students are social in their learning habits. The analyses of the results of this study also concur with the research that indicates African-American students are field-dependent learners, which may create a conflict when using cooperative learning as an instructional method with low SES African-American students.

**Kosar (2003)** investigated the effect of cooperative learning on Social Studies Achievement among 7th class students. The sample comprised 40 students of class 7th equally placed in experimental group and control group on the basis of scores obtained in the Social Studies annual examination. In the experiment cooperative learning resulted in higher achievement as compared to routine method of teaching Social Studies.

**Hines (2008)** conducted a study to determine which cooperative learning strategies teachers used and how these strategies were implemented in order to increase achievement of low-achieving African American students. A mixed method research design, with surveys and interviews, was used for this study. This small-scale study was conducted within an urban school district in Tennessee at four middle schools with five seventh grade Social Studies teachers who consented to participate. Survey questionnaires investigated teacher use of eight cooperative learning strategies identified as applicable at the middle and high school level. Two of the five teachers,
also willingly participated in-depth, face-to-face interviews to gather additional information to elaborate on survey data. Descriptive statistics, frequency distributions and percentages were used to analyze and report on data gathered by the survey questionnaires. Interview data was transcribed, compiled, coded and content analyzed for themes that matched the content of each of the research questions. Study results indicated that teachers’ overall actual use of cooperative learning strategies was quite frequent and these strategies ranged from presenting and explaining, to modeling and intervening, to teaching the skills needed for students to work together. The specific cooperative learning strategies used by teachers in this study to promote low achieving African American students to succeed were Student Teams Achievement Division (STAD) and Learning Together. Study findings implied that to maximize effectiveness of cooperative learning strategies in the classroom, it was important that teachers know what role he/she must take for student success, and the steps for implementing a particular cooperative learning strategy. Based on study findings, recommendations were made for the professional development of teachers in the use of cooperative learning strategies.

Slagle (2009) conducted a study on “The Use of the Cooperative Learning Strategy STAD to promote academic achievement in a High School Social Studies Class” on a sample of forty six tenth grade students. The instruments used to collect data included five researcher-designed quizzes and one researcher-designed chapter test. The data from this research project suggested a slight increase in academic achievement among most secondary social studies participants after the implementation of cooperative learning strategy STAD in a social studies classroom.

Ebrahim (2010) in his study compares the effect of two methods of teaching teacher-centered and cooperative learning on student’s science achievement and use of social skills. The sample consists of 163 female elementary science students in eight intact V grade classes in Kuwait. The samples were assigned to two instructional methods and were taught an identical science unit by 4 classroom teachers. The students’s science achievement was measured by a research designed achievement test given to students as a pretest and post test. Students social skills were determined by a researcher designed survey administered as a pre-test and post-test. Analysis of the achievement test scores and social skills survey responses revealed that cooperative learning
strategy have significantly (P 0.05) more positive effect on both students achievement and social skills than teacher centered strategies.

Pandey (2011) conducted a study on “Effect of Cooperative Learning Strategy on Academic Achievement, in Social Science, of Elementary School Children” on class VIII of Rajkiya Madhya Vidyalaya, Desua, Samastipur, Bihar. In this study, the investigator took a sample of 45 students each for experimental and control group. The experimental group was taught through cooperative learning method and the other one through conventional method. It was found that cooperative learning method has a significant impact on the achievement in social science than the traditional method of teaching. But there is no significant difference among boys and girls in respect of achievement in social science of experimental group. This is so because cooperative learning strategy leads to joyful learning as it was observed during the experiment and this process help, in turn, better achievements in their scores.

Kilinc (2012) took up the study “Conceptual learning in social studies classroom: An analysis of Texas Assessment of Knowledge and Skills (TAKS) social studies questions with and without concept” to determine whether 8th, 10th, and 11th grade students perform better on social studies questions which were classified as concept questions compared to questions which were classified as non concept questions. This study also attempts to identify the relationship between correct answers on concept questions and students' demographics. This study used a non-experimental descriptive, co relational, and causal-comparative research designs. This study used secondary data analysis, which involves a re-analysis of data collected for another study or purpose. The data for this study was gathered from Texas Education Agency, for all students who took the Spring 2006 and Spring 2009 version of the Grade 8, Grade 10, and Grade 11 Social Studies TAKS Tests. A statistical significant difference was found between the percentage of correct concept question and non concept questions. Students had higher achievement on non concept questions than concept questions. The researcher compared students’ correct answers for concept questions between years, the result indicated that students scored higher on concept questions in 2009 than 2006. Also, there was a significant difference between male students and female students. Male students had a higher mean of concept questions.
than female students. In addition, Grade 11 had a higher mean on concept questions than Grade 10 and Grade 8. The researcher found significant differences among ethnicity. Asian students and White students scored better on concept question than other ethnic groups. The researcher also examined the correlation between concept questions and non concept questions.

2.3.2 REVIEW OF LITERATURE RELATED TO JIGSAW AND ACHIEVEMENT

Aronson et al. (1978) examined 300 students from five elementary schools in which some teachers implemented the jigsaw strategy and some teachers did not. Students in both the jigsaw classrooms and non-jigsaw classrooms were studying a unit on colonial America. Students in both groups were administered a pretest on the material. The results of the pretest indicated that there were no differences in academic achievement between the two groups. After both groups had completed the colonial America unit they were administered a post-test. The students who received the jigsaw treatment scored higher on the post-test than the non-jigsaw classroom which indicated that the jigsaw method was more effective than what was the method of instruction in the non-jigsaw classroom (Aronson, Blaney, Stephan, Sikes, and Snapp, 1978).

Johnson et al. (1978) examined 30 high achieving math students. The students were observed for five months in an individualized math program and were ranked from highest to lowest based on academic achievement. Fourteen students were placed in a non-cooperative classroom and the remaining 16 were placed in cooperative groups. Students in the non-cooperative group worked on their assignments individually while students in cooperative learning groups worked together. The students were tested for daily achievement and final achievement. The results of the study revealed a higher level of academic achievement for the students in the cooperative/jigsaw groups than for students in the non-cooperative individualized group.

Sharan (1980) revealed that minority students' academic achievement increased utilizing the jigsaw strategy. However, he noted that the students in the study were administered true/false, multiple choice, and matching assessments whereas an assessment of the students' critical thinking, information analysis, and problem
solving skills would have been more appropriate evaluation of students improvement in academic achievement as a result of participating in jigsaw group.

Natthy (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 twenty four 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.

Mattingly et. al. (1991) Cooperative learning generally refers to students working together to achieve academic objectives and the instructional procedures that structure the students' collaborative efforts. Jigsaw is a cooperative learning model that involves small groups of 5-6 students teaching each other subject matter about which they have become "experts" with success dependent upon student cooperation. Previous studies have shown Jigsaw to be an ineffective cooperative technique. In this study, a variation of Jigsaw called Jigsaw II was used to see if the modified version would produce superior academic results when compared to a more conventional whole-class instructional process. Two ninth grade geography classes at a U.S. Department of Defense high school in Germany were the treatment groups. The two classes were assigned randomly to Jigsaw II (n=23) and to conventional, whole class (n=22) instructional treatments. Based on pretest and posttest results, the study concluded that superior academic achievement may be reached through proper employment of Jigsaw II. Two instructional conditions must be met for small group cooperative learning to be consistently effective. First, students in a learning group must work toward a group goal and reward that can be achieved only if they work together cooperatively. Second, students must be publicly accountable to their peers for their individual contributions to the achievement of the group's goal.
Zetty (1992) undertook a comparison of the STAD and Jigsaw cooperative learning methods in a college-level microcomputer applications course. This study examined the effects of two cooperative learning methods on the achievement, computer anxiety, and classroom environmental preferences (whole class, small cooperative groups, or individualized). One group received instruction using the Student Teams Achievement Division (STAD) method (n = 26), while the other group was taught using the Jigsaw method (n = 27); both groups were taught for one semester (15-weeks) by the same instructor. Although both cooperative groups reported statistically significant achievement gains for each application, the Jigsaw group scored significantly higher than the STAD group with the DOS ($F(1, 48) = 8.02, p < .01$) and spreadsheet ($F(1,49)= 4.54, p < .04$) applications. Gender was a significant factor within the database application ($F(1,49) = 5.06, p <.03$), favoring the females. Both groups reported declining levels of computer anxiety throughout the course with a statistically significant reduction in computer anxiety at the completion of the spreadsheet application ($F(1,52)= 2.93, p < .05$), and again at the completion of the course ($F(1, 52) = 8.08, p < .05$). Gender was non-significant, although males reported slightly lower levels of computer anxiety than females throughout the course. After experiencing small cooperative group learning, both the STAD and Jigsaw groups reported increased preferences for whole class and individualized instruction and decreased preferences for small cooperative group settings. Qualitative data recorded during the study, however, revealed a change in the teacher's attitude from a preference for lecture/demonstration teaching to the use of the Jigsaw cooperative learning method.

Stepka (1999) undertook a comparison of cooperative learning/the Jigsaw classroom and lecture at the community college level. This study examined the difference in academic achievement among students in two sections of Principles of Microeconomics at a rural community college under two teaching strategies: Jigsaw cooperative learning method and the lecture method. Previous research suggests that students who engage in cooperative learning strategies have better academic achievement than those students who work individually or competitively. A pre-test/post-test was given to both sections to (1) establish homogeneity of the two sections and (2) to determine if one group performed better than the other did at the end of the semester. The same instructor taught both sections and achievement was
measured by group quizzes and individual examinations. The results were mixed. On occasion, students in the Jigsaw cooperative learning section scored higher and on other occasions, the lecture method scored higher. Overall, the Jigsaw cooperative learning section scored higher than the lecture section when compared academically and the overall students' perceptions displayed by the students in written documentation indicated positive feelings for working within groups.

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 ad2 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.

Perkins and Saris (2001) demonstrated the use of the jigsaw classroom technique in an undergraduate statistics course. They noted that a part of class instruction was doing worksheets as part of an instruction. Worksheets are effective because they give immediate feedback on applying statistical ideas to sample, allow for repeated practice, make students active over passive learners, and they can ask for help from the instructor as needed. The problem with worksheets though. One is uneven ability or readiness to complete the worksheet. One student may not have any problems while another becomes frustrated by the process. Another issue is that in statistics the worksheets require a lot of time to complete because of the many separate steps. In order to overcome these problems and still benefit students, they adapted Aronson’s jigsaw classroom to fit undergraduate students. Students worked in groups on two separate occasions. In the first, there were four sheets given out. Pairs of students were given the same worksheet and worked together to compute sample size, the sum of the raw scores, the sum of the squared raw scores, and the sum of squares for one of the four groups. Each of the handouts included a blank ANOVA table with formulas and instructions on how to complete it collaboratively with three other
students. The other set of worksheets was on a two-way, chi-square test of independence for three different studies. For the first study there was an example of the computation and interpretation of chi-square. After a discussion of the first example, students received one of two worksheets that directed them through the steps for completing the chi-square procedures for one of the remaining designs with partial solution for each step. The handout also contained the next-to-last step for the other remaining design. It was designed that one group of students received step-by-step instruction and partial solutions for the second and a nearly complete solution for the third design and the other group received step-by-step information for the third design and the almost complete solution for the second design. Students were instructed to seek out a classmate with a complementary handout. Students were then asked to rate the benefits of the exercise using a five-point Likert rating. They were asked to rate the exercise on usefulness of getting help, giving help, working with classmates, providing an alternative to a lecture, saving time, and understanding the statistical procedures. They concluded from the results that students perceived the jigsaw procedure as being very positive especially as an alternative learning experience. Students saw using the jigsaw technique as more useful for practical purposes then for interpersonal purposes such as working with others, giving help, or getting help. Students appreciated the technique as a time-saver and viewed it as a change of pace from lectures.

Chen (2004) investigated the effectiveness of cooperative learning methods in teaching English as a foreign language to a group of 110 college students (34 males and 76 females). Two cooperative learning methods, 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 that males performed better in a cooperative structure than in the traditional competitive structure.

Ghina (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.

Wang (2006) studied the effects of jigsaw cooperative learning on motivation to learn English at Chung-Hwa Institute of Technology, Taiwan. This study focused on impacts of the use of cooperative learning as a teaching method on EFL learners. The setting was the English classes of Chung-Hwa Institute of Technology (CHIT). The subjects were 77 students from two classes, majoring in Business Administration. The purpose of this study was to determine the differential effects (i.e., achievement in learning English, motivation orientation and intensity, and attitude concerning English language and culture) on students between the traditional Chinese teaching method and the Jigsaw cooperative learning method at CHIT. The research design for the study was quasi-experimental and descriptive. The independent variable was the instructional method: one class utilized the Jigsaw approach to cooperative learning while the other utilized the traditional Chinese approach. The dependent variables were academic performance, motivation orientation toward English, motivation intensity toward learning English, and attitude toward learning of English and English culture as determined by final exam and questionnaire scores. The questionnaires and exam were administrated at the beginning and end of the semester. Data analysis indicated that students learning cooperatively had higher final course grades and made more integrative statements on the measure of orientation toward learning English than students who learned using the traditional Chinese methods. Participants who
learned using cooperative strategies had more positive attitudes about learning English connected with their desire to associate with English speakers and had more positive attitudes about the learning mechanism they experienced than those instructed through traditional Chinese learning strategies. There were no differences between the groups on the measure of motivation intensity. Recommendations were made to improve the use of the Jigsaw method of cooperative learning through both pedagogical and policy modifications.

Hanze and Berger (2007) in their study “Cooperative learning, motivational effects and student characteristics: An experimental study comparing cooperative learning and direct instruction in 12th grade physics classes” experimented on a sample of 137 students in 12th grade physics classes. It was quasi-experimental study in which jigsaw classroom method of cooperative instruction was compared 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 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. Increases in feelings of competence with cooperative learning were associated with better performance in physics.

Rai and Samsudin (2007) conducted an action research on comparing small groups versus whole class jigsaw in a secondary three Chemistry class to test the two different types of jigsaw methods, conventional small group jigsaw method and modified whole class jigsaw method. Equivalent groups Pre test - Post test experimental design was used and found that there is no significant difference in the control and experimental groups. This shows that the modified whole class jigsaw method is just as useful a cooperative learning tool as the small group jigsaw.

Thangarajathi and Viola (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.

**Doymus (2008)** in his study “Effects of Cooperative Learning Strategy on Teaching and Learning Phases of Matter and One Component Phase Diagrams” included a total of 108 Chemistry students in two different classes during the 2004-05 academic year. One of these classes served as experimental group (n=52), which was taught by using cooperative learning (jigsaw) methods, the other class served as control group (n=56), taught by using traditional learning method. The results indicate that the instruction based on cooperative learning yielded significantly better achievement in terms of the Chemistry achievement test (CAT) and Phase achievement test (PAT) scores compared to the test scores of the control group.

**Jansoon et al. (2008)** conducted their research to study Thai undergraduate chemistry practical learning experiences using the jigsaw IV method. A hands-on experiment based on the Jigsaw IV method using a real life example based on green tea beverage was designed to improve student affective variables for studying topics related to dilution. Earlier work by the authors and other published work suggest Thai students’ do not much enjoy studying topics such as dilution chemistry and stoichiometry, and the authors wished to develop learning experiences for such topics that students might enjoy more. The Jigsaw method is, however, reasonably complex and the approach used is radically different to normal teaching approaches used in Thai science classes, but is the type of teaching approach recommended in the current Thai science curriculum. Here we reported on 244 Thai first year undergraduate students’ learning approaches; their past learning approaches and their learning experiences with a new cooperative learning approach based on the Jigsaw IV method. The research findings, based on self-completion questionnaires and classroom observations suggest that in
the past these students did not particularly enjoy learning in chemistry practical classes, and they reported using highly formulaic approaches to solve chemistry problems for dilution. In contrast they enjoyed the more interactive nature of the Jigsaw IV approach, and in particular acting as an ‘expert’ in front of their peers, which enhanced their self-confidence about chemistry learning in practical classes. They did, however, struggle to understand the purpose of the new teaching approach based on the Jigsaw IV method.

Beckett (2009) studied the effect(s) of a Jigsaw cooperative learning strategy on students’ understanding of earth science concepts. This intervention took place in a SDAIE General (Earth) Science class. All the students were Hispanic, speaking Spanish as their primary language. The students had a variety of English abilities ranging from students who began learning English at the beginning of the school year to students who had been learning English since early elementary school. A translator was present daily to assist with translations for the newcomers who were just learning English. The subject was chosen due to unacceptably low academic achievement scores, participation, and motivation to complete assignments. Students participated in 3 separate jigsaw interventions, all of which took place over a 3 and a half week time period. The intervention differentiated the instruction for the varied English levels, encouraged interactive participation among students, and provided a reason for students to complete their assignments. Data was collected through student work during the activity, teacher made pre-quizzes, and teacher made post-quizzes. Attitude surveys focusing on assignment completion and participation were given before and after the jigsaws. An attitude survey on the jigsaw strategy itself was given after the final intervention. Throughout the intervention, observational field notes on student behavior were made. Data was also collected by observing the entire class to mark behavior tallies and engagement levels. Jigsaws were found to increase students’ understandings of earth science concepts, but not consistently to a high level. Jigsaws helped half of the students with low grades to improve their grades but did not help to improve the grades of students who already had higher grades. Students’ participation increased and students felt they completed more assignments. However the data did not reveal much of a change in assignment completion. The newcomers had a noticeably greater increase in achievement and participation.
Niemi (2009) undertook a study to compare two different cooperative learning models in terms of their effects on student achievement in middle level social studies classes. The research question addressed in this study involved understanding the nature of the relationships between different cooperative learning models, gender, ability level and achievement in social studies students. The two cooperative learning models compared were the structured dyad model, which was effective in studies on reading achievement, and the Jigsaw II model, which was well-suited for social studies students. This quantitative study compared the differences between unit pre-and posttest scores of 6th grade students using repeated-measures t test analysis. The study revealed that the learning using a structured dyad model resulted in significantly higher student achievement scores than learning using the Jigsaw II model. Implications of the study include promoting the use of cooperative learning in classrooms to converting schools into learning communities.

Zahrah (2009) conducted a study “Using Jigsaw Technique to Improve the Writing Ability of the Second Year Students of MTs Negeri 2 Medan”. This study was designed to improve the students' writing ability by using Jigsaw technique. The objective of the study was to find out how Jigsaw technique can be used to improve the writing ability of the second year students' of MTs Negeri 2 Medan. The finding of the study indicated that Jigsaw technique was successful in improving students' writing narrative text. The improvement could be seen from the increase of students' average writing score from 49.6 in the preliminary study, and 60.2 in the first cycle, to 70.2 in the second cycle. Based on the findings, it was suggested that English teachers should apply the Jigsaw technique since it is beneficial not only in improving the writing narrative text but also in motivating students to write and work together to describe the event in the picture. Besides, the technique is also helpful in encouraging students to actively participate in writing narrative text.

D’soouza (2010) conducted a study to know the effectiveness of cooperative learning in the teaching of topics natural resource and types of pollution to students of 7th standard. It was experimental study. Jigsaw method of cooperative learning was used to teach experimental group for this study on the effectiveness of cooperative learning in the teaching of topic natural resources sample size was 48 and in the teaching of the topic types of pollution the sample size was 30. The results of the study revealed that
there was significant difference in achievement scores before and after the use of Jigsaw in both the topics. The investigator also concluded that having students work together is a powerful way for them to learn and has positive effect on classroom climate and peer acceptance.

Igel (2010) grounded within social-psychology and learning theory, properly specified cooperative instruction requires design elements such as positive interdependence and individual accountability that go beyond basic group-mediated instruction. Despite its popularity and a large corpus of literature, practitioners and researchers alike often confuse cooperative instruction with less stringent forms of group-mediated instruction. The present study clarifies this distinction, and meta-analyzes the results of twenty rigorous studies on the effect of cooperative interventions on K-12 student learning. The meta-analysis employs extremely rigorous selection criteria to maintain internal validity and newly developed statistical adjustments to account for analytic errors found throughout much of the primary research base. Findings reveal a moderate overall effect (0.44) for cooperative interventions with differential estimates across a range of moderators. These findings are placed within the context of the larger corpus of research on cooperative learning and its implications for practitioners discussed.

Lin (2010) studied the Perspectives of teachers and students toward cooperative learning jigsaw tasks in Taiwanese EFL classrooms. A qualitative descriptive approach was utilized to discover and interpret the elements of both Taiwanese teachers and students' perspectives toward CL Jigsaw as an instructional approach in English classrooms. This qualitative study also served to illuminate insights about the Taiwanese students' perspectives on the differences between the CL approach and GTM (Grammar Translation Method) instruction within their English learning. The triangulation method in this study included a demographic questionnaire, interviews, non-participatory observation, field note taking, and the survey questionnaires for the purpose of collecting as much data as possible to explore the participants' perspectives toward the CL Jigsaw approach. The results showed that the CL Jigsaw technique significantly contributed to the English learning of the university level freshmen students at Southern Taiwan University in Taiwan. The findings generated from the interviews, classroom observations, and survey questionnaires indicated that Taiwanese instructors and students had both positive and
negative opinions about the CL Jigsaw technique. However, both teachers and students expressed their willingness to continue adopting this teaching approach to either teach or learn English in their future English classes. Additionally, teachers’ difficulties about implementing the CL Jigsaw technique were analyzed in this study. Ultimately, both Taiwanese instructors and students highlighted the important factors that made the CL Jigsaw technique successful in their English classroom learning.

**Pereira (2010)** conducted a study on “Effectiveness of Collaborative method on the achievement in Science at Secondary Level”. In the present study, equivalent pretest posttest design was selected and sample of the study consisted of 100 students of class VIII equally divided into experimental and control group. Jigsaw strategy designed by Elliot Aronson and colleagues in 1978 was used and students were divided into 5 sub-groups consisting of 7 members each. It was found that collaborative method was much better than traditional method of teaching.

**Law (2011)** reported that review of literature indicates that cooperative learning with teacher-guided instruction is more effective in helping young children to learn than cooperative learning with minimal guidance. In the present study, two different cooperative learning activities (jigsaw and drama) and a control condition (a traditional teacher-led approach) were compared. The participants were 279 Grade 5 Hong Kong students located in nine classrooms. The two experimental conditions emphasized teachers' cognitive support in helping students to understand a text through both teacher-led and student-led activities. Post-test data included a reading comprehension test and three questionnaires that investigated students’ goal orientations, initial level of relative autonomy and perceptions of instructional practices. Findings indicate that students in the jigsaw group outperformed students in both the drama group and the control group in the reading comprehension test. The implications of conducting cooperative learning activities with well-planned teacher guidance are discussed.

**Sahin (2011)** published a paper on Effects of Jigsaw III Technique on Achievement in Written Expression; the objective of this paper is to compare the Jigsaw III technique (of cooperative learning) with the instructional teacher-centered teaching method in six graders in terms of the effect of written expression on their academic success. The universe of the study consists of 71 sixth-grade students studying during
2009-2010 academic term in a primary school in the province of Erzurum. Two classes were randomly selected: one (n = 35) of which was the control group where teacher-centered teaching method was applied, the other being experimental group (n = 36) where the Jigsaw III technique was applied. In the study, one of the most common application, pretest/posttest with control group experimental design, was chosen. The data regarding the academic success of the groups were collected by means of the achievement test in Turkish course as pretest, posttest and retention test; the students' opinions about the group works were obtained through feedback form, group work opinionnaire, and data were analyzed through 11.5 SPSS program. The results of the statistical analysis of teaching a written expression course showed that the experimental group did significantly better than the control group in terms of academic success. In addition, it can be said that the students had positive impressions on the Jigsaw III technique.

Maxfield (2011) studied the effects of small group cooperation methods and question strategies on problem solving skills, achievement, and attitude during problem-based learning. The purpose of this study was to examine the effects of integrating instructional strategies during problem-based learning (PBL) on student learning. A quasi-experimental 2 by 2 factorial design with an appended control was used to examine the effects of traditional teacher-led instruction compared to problem-based learning instruction with the interactions of cooperative learning methods--Jigsaw and traditional small group--and teacher question strategies--Socratic and didactic--on grade 5 student problem-solving skills, achievement, and attitude toward science. The sample consisted of grade 5 rural middle school students in an Ohio public school district. Six teachers were randomly assigned to the appended control group consisting of a teacher-led lecture-based environment or an experimental group consisting of a PBL environment with modified instructional strategies. Each experimental PBL group consisted of one of the following: traditional small group with didactic teacher questioning, traditional small group with Socratic teacher questioning, Jigsaw cooperative learning with didactic teacher questioning, and Jigsaw cooperative learning with Socratic teacher questioning. Results of the study support the use of PBL to improve student achievement. Students achieve at higher levels in science when compared to traditional teacher-led lecture instruction. The Socratic questioning groups had significantly higher achievement scores.
compared to the didactic questioning groups. The 2 PBL groups that used Jigsaw had a significantly more positive attitude towards science than the traditional small groups. There were no significant differences in problem solving between the groups. To assist in higher achievement and more positive attitudes when implementing PBL, the results of this study support the integration of Jigsaw cooperative learning method and Socratic questioning.

Maden (2011) conducted a study which aims to compare the effects of Jigsaw I technique from the cooperative learning methods and traditional teaching method on academic achievement and retrieval of Turkish teacher candidates in the matter of written expression. The sample of the study consists of 70 students studying at the Department of Turkish teaching in the academic year of 2009-2010. One of the classes was randomly specified as control group (N=34) to which traditional teaching method was applied while the other as test group to which the Jigsaw technique (N=36) was applied. The study was predicated on "Non-equal control group pattern". Learning styles of the groups were determined by the Kolb Learning Style Inventory (LSI). Data about their academic success were collected through Success Test for Written Expression (STWE) applied as pre-test and post-test and views of students about Jigsaw I technique were collected through a form questioning students' views (SVF). Then, the results obtained from them were analyzed. It was observed as a result of statistical analyses that there was not a significant variation in favor of the test group in terms of academic success and stability between the test group and the control group in teaching the written expression subject. It was also determined according to the results obtained from the study that the students stated positive views for the Jigsaw I technique.

Lewis and Tran (2012) investigated the effects of jigsaw cooperative learning on the achievement and knowledge retention of 80 final-year Vietnamese mathematics students, as well as reporting their attitudes toward this form of learning. These tertiary students were divided into two matched groups of 40 to be taught by the same lecturer. In the experimental group, jigsaw learning was employed, while in the control group, lecture-based teaching was used over the six weeks of instruction. The results showed that students in the experimental group, who perceived their instruction as more cooperative and more student-centered, had significantly greater improvement on both achievement and retention.
measures than did the students in the control group. A survey revealed favorable responses toward jigsaw learning. The major findings of this study support the effectiveness of jigsaw learning for students in Vietnamese higher education institutions.

Karacop and Doymus (2013) conducted a study to determine the effect of jigsaw cooperative learning and computer animation techniques on academic achievements of first year university students attending classes in which the unit of chemical bonding is taught within the general chemistry course and these students' learning of the particulate nature of matter of this unit. The sample of this study consisted of 115 first-year science education students who attended the classes in which the unit of chemical bonding was taught in a university faculty of education during the 2009-2010 academic year. The data collection instruments used were the Test of Scientific Reasoning, the Purdue Spatial Visualization Test: Rotations, the Chemical Bonding Academic Achievement Test, and the Particulate Nature of Matter Test in Chemical Bonding (CbPNMT). The study was carried out in three different groups. One of the groups was randomly assigned to the jigsaw group, the second was assigned to the animation group (AG), and the third was assigned to the control group, in which the traditional teaching method was applied. The data obtained with the instruments were evaluated using descriptive statistics, one-way ANOVA, and MANCOVA. The results indicate that the teaching of chemical bonding via the animation and jigsaw techniques was more effective than the traditional teaching method in increasing academic achievement. In addition, according to findings from the CbPNMT, the students from the AG were more successful in terms of correct understanding of the particulate nature of matter.

Mbacho and Bernard (2013) conducted a study to find out if the use of Jigsaw Cooperative learning Strategy during instruction of Surds and Further logarithm in mathematics to form three 17 year old students had effects on their performance. Surds and Further logarithm are topics that are performed poorly at the KCSE. There is however inadequate documented information in research conducted in Kenya on effects of the use of Jigsaw Cooperative learning Strategy on students’ achievement in mathematics. Solomon four non-equivalent control group research design was used in the study. The two experimental groups received the Jigsaw cooperative learning Strategy as treatment and two control groups were taught using the conventional learning/teaching methods. A simple random sample of four co-education district
secondary schools was selected from Laikipia East District. The sample size was 160 students out of a population of about 20,000 students in the district. A mathematics achievement test (MAT) was used for data collection. The instrument was validated and had reliability coefficient of 0.87. Data was analyzed using t and ANOVA tests to test hypothesis at 0.05 significance level. Findings of this study show that learners taught using Jigsaw cooperative learning strategy performed better than those taught using Conventional learning methods. The results also show that there is no significant gender difference in achievement when learners are taught using Jigsaw cooperative learning strategy.

2.3.3 SUMMARY OF REVIEWS RELATED TO ACHIEVEMENT

Review of literature shows that research studies have reported positive effect of cooperative learning on achievement in Science (Tjosvold et al., 1977; Ahuja, 1994; Okebukola, 1986; Watson, 1988; Dienno and Hilton, 2005; Kaul, 2008; Chester, 2009; Ebrahim, 2010; Chopra and Gupta, 2013) Mathematics (Coston, 1994; Nowak, 1996; Whicker, 1997; Lucas, 1999; Vaughan, 2002; Bosfield, 2004; Thangarajathi and Viola, 2007; Mehra and Thakur, 2006&2008; Malhan and Suri, 2011; Bunarashi, 2012; Mbacho and Bernard, 2013) Social Science (Johnson et al., 1978; Allen and Van sickle, 1984; Dhamija, 1985; Natthy, 1986; Matingly et al., 1991; Dotson, 2001; Sasidharan, 2003; Pandey, 2011; Nederhood, 1986; Johnson, Johnson and Wilderson, 1980(Geography); Lang, 1983(Economics) and in other school and college subjects (Sharan et al., Skon, 1979; Wodarski et al. 1980; Humphary et. al., 1982; Johnson et al. 1981; Perrault, 1982; Webb, 1982; Baseda, 1983; Slavin, 1983; Bak, 1993; Zisk, 1993; Hooper et al., 1993; Lickona, 1991; Orlando, 1991; Slavin, 1991; Steevans and Slavin, 1995; Lynch, 1996; Singh and Rai, 2002; Berkley et. al., 2005; Hemamalini and Yashodhra, 2006; Ahmad, 2008; George, 2008; Mehra and Thakur, 2008; Sharma and Sharma, 2008; Alharbi, 2008; Pushpanjali and Satyaparakasha, 2010; Shimazoe and Aldrich, 2010; Chang, 1998; Bertucci et al., 2010). Igel (2010) also reported a moderate overall effect (0.44) for cooperative interventions with differential estimates across a range of moderators. Few studies have reported no positive effect of different cooperative learning methods on achievement in other subjects (Abu and Flower; Lang, 1983(TGT); Hanze and Berger, 2007).

Along with other methods of Cooperative learning, Jigsaw has also shown positive effect on academic achievement (Social Science, English, Science, math and other subjects) Aronson et al. 1978, Sharan, 1980; Walker and Crogan, 1988;
Mattingly et. al., 1991; Zetty, 1992; Stepka, 1999; Wang, 2006; Rai and Samsudin, 2007; Doymus, 2008; D’souza, 2010; Pereira, 2010; Lin, 2010; Lewis and Tran, 2012; writing narrative text, Zahrah, 2009; literal and higher order reading comprehension, Ghaith and El-Malak, 2004; One study reported Jigsaw more effective as compare STAD to improve academic achievement (Chen, 2004). Some studies also revealed that jigsaw helps low skilled students performed as well as their average and high skilled counterparts (Barett 2000); low graders to improve their grades (Beckett, 2009); to make students active in classroom (Oludipe and Awokoy, 2010);

One study reported Dyad method was more effective as compared to jigsaw (Niemi, 2009) and Jigssaws did not help to improve the grades of students who already had higher grades (Beckett, 2009). Rai and Samsudin (2007) has reported modified whole class jigsaw method is just as useful a cooperative learning tool as the small group jigsaw. Apart from significant effect on achievement, some studies have divulged that Jigsaw method is also effective to improve retention (Humphrey, 1980; Sasidharan, 2003; Berkely, 2005; George, 2008; Mehra and Thakur, 2006,2008; Malihan And sirri, 2011).

Review of literature shows that male and female have equal achievement through cooperative learning (Webb, 1984; Lucas, 1999; Hemamalini and Yashodhara, 2006; Pandey, 2011; Chopra and Gupta, 2013; but few studies reported males performed better than females Chen, 2004; Esdaille, 1996; Hassans and fook, 2012 and Zetty, 1992 reported female performed better than males. So there is no consensus among researchers regarding the effect of cooperative learning in favor of male or female.

Above cited studies confirm positive effects of specific cooperative learning methods on achievement across all the subjects and levels of education. Studies related to science, mathematics and language are more as compared to Social study/ Social science. It was found that a few studies (Ahuja, 1994; Hameed, 1997; Singh and Rai, 2002; Tripathy, 2004; Patnaik and Prakash, 2005; Singh, 2005; Hemamalini and Yeshodhara, 2006; Thakur, 2006; Rai and Samsudin, 2007; Thangarajathi and Viola, 2007; Ahmad, 2008; Kaul, 2008; Mehra and Thakur, 2008; Kishore, 2009; Pushpanjali and Satyaparakasha, 2010 in subjects other than Social Science and Hameed, 1997; Punch and Moriarity, 1997; Pandey, 2011 in Social Science) are conducted on Indian soil to verify the claims of cooperative learning in our classroom at school or college level.

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