CHAPTER VII

SUMMARY

7.1 INTRODUCTION

This study has been given in detail in the previous chapters. The present chapter is devoted to description of the study in a nut shell under captions like rationale, statement of the problem, operational definitions, objectives, hypotheses, sample, design, tools, and procedure of data collection, statistical techniques, findings, implications and suggestions for further research. The details of each one of them are given below:

7.2 RATIONALE

National Curriculum Framework-Teacher Education (NCFTE) 2009 has rightly emphasized that Education is neither a mechanical activity of information transmission and nor the teachers are mere information dispensers. Teachers need to be looked at as crucial mediating agents through whom curriculum is transacted and knowledge is co-constructed along with learners. So, a teacher needs to be a facilitator of children’s learning in a manner that helps children to construct knowledge and learning should not be confined to the four walls of the classroom through traditional methods of teaching. For this, we need to shift our focus from these traditional methods (mostly teacher centered) to some innovative teaching learning activities or student centered methods such as cooperative learning methods. Cooperative learning (CL) has been described as one of the most widely investigated educational approaches (Slavin, 1996). Hundreds of studies have cited its benefits, and researchers like Johnson and Johnson (1989, 2000), Slavin (1990) and Sharan (1990) have produced extensive reviews of these. It has also inspired an international organization to provide a forum for researchers: the International Association for the Study of Cooperation in Education (IASCE). Review of literature shows that large amount of research that has been conducted on Cooperative learning. Many studies on specific cooperative learning methods were found. The studies have been conducted across all the levels of education viz primary, middle, secondary and higher education (Dasan, 2007). The research has been conducted in North America, Asia, Europe, the Middle East, and Africa and has involved minority as well as majority populations.
More research on cooperative learning is conducted in the western countries as compared to eastern countries. Most of the studies have revealed positive effect of cooperative learning as compared to traditional method on achievement in different subjects as supported by Tjosvold et al. (1977), Ahuja (1994), Okebukola (1986), Watson (1988), Dienno and Hilton (2005), Kaul (2008), Chester (2009), Ebrahim (2010), Chopra and Gupta (2013) in Science, Coston (1994), Nowak (1996), Whicker (1997), Lucas (1999), Vaughan (2002), Bosfield (2004), Thangarajathi and Viola (2007), Mehra and Thakur (2006, 2008), Melihan and Sirri (2011), Bunarashi (2012) and Mbacho and Bernard (2013) in Mathematics, Sharan et al. and Skon et. al. (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), Berkely et al. (2005), Hemamalini and Yashodhra (2006), Chen (2006), Ahmad (2008), George (2008), Mehra and Thakur (2008), Sharma and Sharma (2008), Alharbi (2008), Pushpanjali and Satyaprakasha (2010) Shimazoe and Aldrich, (2010), Chang (1998), Bertucci et al. (2010) in other school and college subjects. Some studies have been conducted to see the effect of Cooperative learning methods on achievement in Social Science subject (Johnson et al., 1978; Wilderson, 1980; Lang, 1983; Allen and Van sickle, 1984; Natthy, 1986; Mattingly et. al., 1991; Dotson, 2001; Sasidharan, 2003; Pandey, 2011; Nederhood, 1986) and reported positive effect as compared to traditional methods. So, it was very much clear from review of literature related to cooperative learning that many studies on specific cooperative learning methods have reported positive effects across all the subjects. Along with other methods of Cooperative learning, Jigsaw method of cooperative learning has also shown positive effect on academic achievement in different subject like Social Science, English, Science, Mathematics 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; Pereira, 2010; Lin, 2010; Lewis and Tran, 2012). Moreover, Chen, 2004 reported Jigsaw to be more effective as compared to STAD strategy of CL to improve academic achievement. Review of literature also revealed that jigsaw helps, low skilled students to perform 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). A very few studies have reported no positive effect of different cooperative learning methods on achievement (Lang, 1983 (TGT); Abu and Flower, 1997 and Hanze and Berger, 2007) and only one study has reported no significant difference of Jigsaw on achievement as compared to other methods (Niemi, 2009).

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 Satyaprakasha, 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. Moreover, these studies were not conducted using Jigsaw method of cooperative learning. So, there was a need to fill this gap by conducting a study to know the effect of cooperative learning (Jigsaw) on student’s achievement in social science in Indian classrooms. Review of literatures has also showed that STAD and TGT have reported positive results in Mathematics, Languages and Arts. JIGSAW was found to be more effective in Social studies achievement (Slavin, 1982). So, Jigsaw method of cooperative learning was selected as an independent variable in this study.

Achievement in school subjects is always an important component of school education, but in an ever changing society like ours, only mastery in school subjects does not guarantee a successful living, until or unless the learner has not learned life skills to live a happy life. Adapting the concept of life skills given by WHO, our schools have focused on development of life skills among would be citizens. These life skills are an integral part of evaluation scheme in Indian schools. Critical thinking is a major component of these skills. Critical thinking is always considered as an integral part of school curriculum. Recently implemented Continuous Comprehensive Evaluation system has made it mandatory for students and teachers to understand the concept of critical thinking. Few training programs are launched by the CBSE to train
the faculty, but still Teachers are not fully aware about how to develop CT among students and how to evaluate their process in CT. Teachers, students and administrators are in flux to find out a suitable method to develop critical thinking skills. Lee et. al. (2000) and Kawashima and Petrini (2004) have also concluded that CT is a desirable educational outcome; so to develop and practice CT, educators need to re-consider course content and curricular strategies used to develop CT. So, it was need of the hour to study the effect of some innovative methods on critical thinking.

Review of literature reveals that Critical Thinking 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), online learning modules (Brahler et al., 2001), 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; Kowalczyk, 2011; Lai, 2011), collaborative activities (Snyder and Snyder, 2008), case study and Socratic Questioning (Meghani, 1999). Apart from these strategies cooperative learning methods are applied by many researchers to develop CT and it was found from the review of literature that learning through cooperative learning methods has positive effect on CT skills (Wesp and Montgomery, 1998; Abdulghani, 2003; Joung and Keller, 2004; Klimoviene et al., 2006; Riley and Anderson, 2006; Rumpagaporn and Darmawan, 2007; Rashtchi, 2007; Brooks, 2009; Raman, 2009; Guvenc, 2010) but two studies have reported that Cooperative learning has no positive effect on CT skills (Bokeoglu, 2009; Goyak, 2009). Some Studies in which Small group activities were used also reported significant improvement in critical thinking skills (Baseda, 1983; Rabow et al., 1994; Gokhale, 1995; Elliott, 1996; Hamann et al., 2012;) Interactive environment in the classroom improves critical thinking (Wang et al., 2009). Many research studies and writings of various authors stressed on the study of critical thinking skills and critical thinking dispositions instead of looking at one side of critical thinking i.e. either skill or disposition, but there is inconsistency among researchers regarding the relationship between critical thinking skills and critical thinking dispositions (Giancarlo and Facione, 1994; Facione, 1997 and 2000; Lesperance, 2008). Review of literatures also reveals that there is inconsistency of results of critical thinking in relation to gender (Wilson, 1989 in Claytor, 1997 Kuhn’s, 1992; Baxter-Magolda, 1992; King and Kitchener’s, 1994; Denney, 1995; Walsh, 1996; Claytor, 1997; Rudd et al., 2000; Alpay et al. 2003;
Harish, 2011). Hence, these findings suggest to take gender as a moderator variable in the present study.

Teaching methods have a positive effect on developing CT skills in Students (Kowalczyk, 2011), (Pawlowski, 1997). Cooperative learning methods also provide structure in which students have an opportunity to raise logical questions, discuss the content with his peer group, and imitate higher order thinking, critical evaluation of idea, etc. in team work. Review of literature revealed that when some cooperative learning methods are studied, they have shown positive results but they also reported inconsistency of results in context to gender. 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. So, to fill these gaps investigator selected Jigsaw method of cooperative learning as an independent variable and critical thinking as a dependent variable in the present study.

Schools are miniature form of society to prepare young minds to become an active member of the society and make them able to deal effectively with other members of the society. For successful living in society every individual needs some social competencies. Review of literature revealed that cooperative learning has significant effect on different dimensions of social competence as measured by different test (Lickona, 1991; Nowak, 1996; Lucas, 1999; Tripathy, 2004; Thakur, 2006; Sharma and Sharma, 2008; Gillies, 2008; Ebrahim, 2010; Shimarzo and Aldrich, 2010; Aronson and Patnoe, 2011; Leung, 2012). Cooperative learning improves interpersonal relationships (Sharma and Sharma, 2008); decrease levels of loneliness and social anxiety and increases the levels of happiness among the participants (Kocak and Recep, 2012), social-emotional developments, as well as cognitive and academic development are affected by child's social experiences with peers and adults (Kinsey, 2000), student acceptance towards other group and decrease prejudice (Walker and Crogan). With application of cooperative learning methods students become more cooperative and helpful to each other (Gillies, 2002; Pahuja and Kaur, 2006; Gillies, 2008 ; Bertucci et al., 2010; Marhamah and Mulyad, 2013) and positive results are reported on other social variables (McManus and Gettinger, 1996; Nowak, 1996; Whicker, 1997; Fantuzzo et al., 2006, Hanze and Berger, 2007). Application of Cooperative learning also resulted into improvement in Social skills (Jordan and Metais, 1997; Early, 1999; Veenman et al., 2000; Goudas and
Cooperative learning has shown positive effect on self esteem (Johnson et al., 1978; Slavin, 1980; Veenman et al., 2000; Kalaiyarasan and Krishnaraj, 2004; Tripathy, 2004; Bertucci et al., 2010). Few studies have reported that learning through Jigsaw method of cooperative learning has significant effect on many social variables such as social skills (Aronson et al., 1977b), self-esteem (Aronson et al., 1977c), acceptance of classmates (Aronson et al., 1977a; Slavin, 1991), intergroup relations (Aronson et al., 1978), reduces discrimination (Williams, 2004) and positive attitudes about learning (Wang, 2006). Only one study reported no significant effect of Jigsaw on social competence (White and France, 1991). Cooperative learning has also shown positive results on group interaction and attitude towards group/cooperative learning (Skon, 1979; Webb, 1982; Hooper et al., 1993; Kinny, 1989; Veenman et al., 2000; Tripathy, 2004), social relations (Lickona, 1991); higher perceived efficacy (Chang, 1998), liking of others and peer support (Slavin, 1978, Cooper et al., 1980; Tripathy, 2004), race relation by working in groups (Slavin and Madden, 1979), self confidence (Nederhood, 1986) and reduction of anxiety level (Okebukola, 1986). Meta-analysis of different studies on cooperative learning has reported positive effects in all major subjects, all grade levels, in urban and sub-urban schools and for high, average and low achievers (Slavin, 1991 (67 studies) and Johnson et al., 2000 (158 studies)). Students in cooperative learning groups showed increase in number of friends, liking of others (Slavin, 1980 and Nederhood, 1986), increase in interactive behaviours (Nowak, 1996, McManus and Gettinger, 1996) and increase in group effectiveness and interpersonal interactions (Earley, 1999).

Theoretical basis of cooperative learning and research studies have supported many social benefits 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; Pushpanjali and Satyaprakasha, 2010; Chopra and Gupta, 2013) are conducted to see the effect of cooperative learning methods on social variables in Indian conditions. Some studies also revealed that there is an inconsistency of results of social competence in relation to gender (Dhanda et al., 2008; Yadav and Singh, 2011). Due to paucity of extensive research studies in Indian conditions, investigator was unable to reach at any
conclusion regarding the effect of cooperative learning on social competence. So, there was a dire need to study these variables which made the investigator to select social competence as a dependent variable in this study.

Review of literature shows that there is considerable research on specific cooperative learning methods and the research has considerable validity and generalizability on foreign soil. It is an interesting fact that CL is not more commonly used in classroom, as Nath and Ross (1996) commented, “Surprisingly, although cooperative learning is believed to be the most effective among three primary styles of teaching and learning (individualistic, competitive, and cooperative), it remains the least used in classroom settings’ (Johnson and Johnson, 1984, Sarason, 1995).” Few studies are conducted on Indian soil to see the effect of Cooperative learning methods on different subjects and across all the levels of education on wide range of variables. Review of literature guided the investigator to understand the theoretical basis of cooperative learning (Jigsaw) and its effect on cognitive and social variables. Keeping in mind the transitional phase in school education (Teacher-centered to Student-centered) and dearth of research studies on effect of cooperative learning (Jigsaw) on critical thinking, social competence and achievement in social science at school level on Indian soil guided the investigator to select cooperative learning (Jigsaw) as an independent variable and critical thinking, social competence and achievement in social science as dependent variables.

7.3 STATEMENT OF THE PROBLEM

Effect of Cooperative Learning on Critical Thinking Social Competence and Achievement in Social Science of Secondary School Students

7.4 OPERATIONAL DEFINITIONS

Jigsaw is a cooperative learning method that enables each student of a “home” group to specialize in one aspect of a learning unit. Students meet with members from other groups who are assigned the same aspect and after mastering the material in ‘expert group’ they return to the “home” group and teach the material to their group members which enables the students to maximize their own and each other’s learning. Jigsaw IV (with some modification) was used in this study.
**Critical Thinking** refers to critical thinking skills and critical thinking dispositions. Critical thinking skills include analogy, evaluating arguments, logical analysis, interpretation, recognition of assumptions, deduction, inferences which was assessed with critical thinking skill test (developed by Investigator).

**Critical Thinking dispositions** mean the tendencies toward use of certain patterns of intellectual behavior. It requires reasoning, enquiry, analysis/information processing, flexibility and evaluation which was assessed by Critical thinking in everyday life scale developed by Mincemoyer, Perkins, Munyua (2001).

**Social competence** refers to the personal adequacy, interpersonal adequacy and communication skills of the School students which were assessed with social competence scale of Rani and Sharma (2010).

**Achievement in social science** refers to the level of success or proficiency attained in social science subject which was assessed with achievement test (from selected topics) of social science prepared by investigator.

### 7.5 OBJECTIVES

The following were objectives of the study:

1. To develop and validate a test for critical thinking skill
2. To develop and validate a test for Achievement in Social science for 9th class students
3. To study the effect of Jigsaw method of cooperative learning, gender and their interaction on critical thinking skill and its dimensions by taking pre-test scores of critical thinking skill as a covariate.
4. To study the effect of Jigsaw method of cooperative learning, gender and their interaction on critical thinking dispositions by taking pre-test scores of critical thinking dispositions as a covariate.
5. To study the effect of Jigsaw method of cooperative learning, gender and their interaction on Social Competence and its dimensions by taking pre-test scores of Social Competence as a covariate.
6. To study the effect of Jigsaw method of cooperative learning, gender and their interaction on achievement in social science by taking pre-test scores of achievement in social science as a covariate.
7.6 HYPOTHESES

The following were the Hypotheses of the study:

H₀ la: There is no significant difference in the adjusted mean scores of Critical Thinking Skill of experimental and control groups when pre-test scores of critical thinking skill are taken as a covariate.

H₀ 1b: There is no significant difference in the adjusted mean scores of Critical Thinking Skill of Boys and Girls when pre-test scores of critical thinking skill are taken as a covariate.

H₀ 1c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Critical Thinking Skill when pre-test scores of critical thinking skill are taken as a covariate.

H₀ 2a: There is no significant difference in the adjusted mean scores of Analogy (1st dimension of critical thinking skill) of experimental and control groups when pre-test scores of analogy are taken as a covariate.

H₀ 2b: There is no significant difference in the adjusted mean scores of Analogy (1st dimension of critical thinking skill) of Boys and Girls when pre-test scores of analogy are taken as a covariate.

H₀ 2c: There is no significant effect of interaction between group and gender on the adjusted mean scores of analogy (1st dimension of critical thinking skill) when pre-test scores of Analogy are taken as a covariate.

H₀ 3a: There is no significant difference in the adjusted mean scores of Evaluating Arguments (2nd dimension of critical thinking skill) of experimental and control groups when pre-test scores of Evaluating Arguments are taken as a covariate.

H₀ 3b: There is no significant difference in the adjusted mean scores of Evaluating Arguments (2nd dimension of critical thinking skill) of Boys and Girls when pre-test scores of Evaluating Arguments are taken as a covariate.

H₀ 3c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Evaluating Arguments (2nd dimension of critical thinking skill) when pre-test scores of Evaluating Arguments are taken as a covariate.
$H_0$ 4a: There is no significant difference in the adjusted mean scores of Logical Analysis ($3^{rd}$ dimension of critical thinking skill) of experimental and control groups when pre-test scores of Logical Analysis are taken as a covariate.

$H_0$ 4b: There is no significant difference in the adjusted mean scores of Logical Analysis ($3^{rd}$ dimension of critical thinking skill) of Boys and Girls when pre-test scores of Logical Analysis are taken as a covariate.

$H_0$ 4c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Logical Analysis ($3^{rd}$ dimension of critical thinking skill) when pre-test scores of Logical Analysis are taken as a covariate.

$H_0$ 5a: There is no significant difference in the adjusted mean scores of Interpretation ($4^{th}$ dimension of critical thinking skill) of experimental and control groups when pre-test scores of Interpretation are taken as a covariate.

$H_0$ 5b: There is no significant difference in the adjusted mean scores of Interpretation ($4^{th}$ dimension of critical thinking skill) of Boys and Girls when pre-test scores of Interpretation are taken as a covariate.

$H_0$ 5c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Interpretation ($4^{th}$ dimension of critical thinking skill) when pre-test scores of Interpretation are taken as a covariate.

$H_0$ 6a: There is no significant difference in the adjusted mean scores of Recognition of Assumption ($5^{th}$ dimension of critical thinking skill) of experimental and control groups when pre-test scores of Recognition of Assumption are taken as a covariate.

$H_0$ 6b: There is no significant difference in the adjusted mean scores of Recognition of Assumption ($5^{th}$ dimension of critical thinking skill) of Boys and Girls when pre-test scores of Recognition of Assumption are taken as a covariate.

$H_0$ 6c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Recognition of Assumption ($5^{th}$ dimension of critical thinking skill) when pre-test scores of Recognition of Assumption are taken as a covariate.
H₀ 7a: There is no significant difference in the adjusted mean scores of Deduction (6th dimension of critical thinking skill) of experimental and control groups when pre-test scores of Deduction are taken as a covariate.

H₀ 7b: There is no significant difference in the adjusted mean scores of Deduction (6th dimension of critical thinking skill) of Boys and Girls when pre-test scores of Deduction are taken as a covariate.

H₀ 7c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Deduction (6th dimension of critical thinking skill) when pre-test scores of Deduction are taken as a covariate.

H₀ 8a: There is no significant difference in the adjusted mean scores of Inferences (7th dimension of critical thinking skill) of experimental and control groups when pre-test scores of Inferences are taken as a covariate.

H₀ 8b: There is no significant difference in the adjusted mean scores of Inferences (7th dimension of critical thinking skill) of Boys and Girls when pre-test scores of Inferences are taken as a covariate.

H₀ 8c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Inferences (7th dimension of critical thinking skill) when pre-test scores of Inferences are taken as a covariate.

H₀ 9a: There is no significant difference in the adjusted mean scores of Critical Thinking Dispositions of experimental and control groups when pre-test scores of Critical Thinking Dispositions are taken as a covariate.

H₀ 9b: There is no significant difference in the adjusted mean scores of Critical Thinking Dispositions of Boys and Girls when pre-test scores of Critical Thinking Dispositions are taken as a covariate.

H₀ 9c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Critical Thinking Dispositions when pre-test scores of Critical Thinking Dispositions are taken as a covariate.

H₀ 10a: There is no significant difference in the adjusted mean scores of Social Competence of experimental and control groups when pre-test scores of Social Competence are taken as a covariate.

H₀ 10b: There is no significant difference in the adjusted mean scores of Social Competence of Boys and Girls when pre-test scores of Social Competence are taken as a covariate.
$H_0$ 10c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Social Competence when pre-test scores of Social Competence are taken as a covariate.

$H_0$ 11a: There is no significant difference in the adjusted mean scores of Personal Adequacy (1st dimension of social competence) of experimental and control groups when pre-test scores of Personal Adequacy are taken as a covariate.

$H_0$ 11b: There is no significant difference in the adjusted mean scores of Personal Adequacy (1st dimension of social competence) of Boys and Girls when pre-test scores of Personal Adequacy are taken as a covariate.

$H_0$ 11c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Personal Adequacy (1st dimension of social competence) when pre-test scores of Personal Adequacy are taken as a covariate.

$H_0$ 12a: There is no significant difference in the adjusted mean scores of Interpersonal Adequacy (2nd dimension of social competence) of experimental and control groups when pre-test scores of Interpersonal Adequacy are taken as a covariate.

$H_0$ 12b: There is no significant difference in the adjusted mean scores of Interpersonal Adequacy (2nd dimension of social competence) of Boys and Girls when pre-test scores of Interpersonal Adequacy are taken as a covariate.

$H_0$ 12c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Interpersonal Adequacy (2nd dimension of social competence) when pre-test scores of Interpersonal Adequacy are taken as a covariate.

$H_0$ 13a: There is no significant difference in the adjusted mean scores of Communication Skills (3rd dimension of social competence) of experimental and control groups when pre-test scores of Communication Skills are taken as a covariate.

$H_0$ 13b: There is no significant difference in the adjusted mean scores of Communication Skills (3rd dimension of social competence) of Boys and Girls when pre-test scores of Communication Skills are taken as a covariate.
H₀ 13c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Communication Skills (3rd dimension of social competence) when pre-test scores of Communication Skills are taken as a covariate.

H₀ 14a: There is no significant difference in the adjusted mean scores of Achievement in social science of experimental and control groups when pre-test scores of Achievement in social science are taken as a covariate.

H₀ 14b: There is no significant difference in the adjusted mean scores of Achievement in social science of Boys and Girls when pre-test scores of Achievement in social science are taken as a covariate.

H₀ 14c: There is no significant effect of interaction between group and gender on the adjusted mean scores of Achievement in social science when pre-test scores of Achievement in social science are taken as a covariate.

7.7 SAMPLE

The sample in the study was used at two stages:

7.7.1 Sample for development of Critical Thinking Skill and Achievement Test in Social Science

Three schools were randomly selected from a list of all the schools [Total=782 (447 Pvt. + 281 Govt.)] of Ludhiana district. Data for the development of test (Critical Thinking Skill Test and Achievement Test) were collected from 9th class students of these schools. Boys and girls both were included in the sample. Selected schools were affiliated to Punjab School Education Board, Mohali. One was situated in rural area and another two were in city.

The size of the sample at first stage was 210 (for item analysis of the tests). Out of these, 150 students were from R. S. Model Sr. Sec. School, Ludhiana and 60 students from Mukat Vidya Mandir Sr. Sec School, Ludhiana. All these students were of class 9th from Ludhiana district.

110 students were selected as sample at second stage (for assessing reliability). Out of these, 40 students were from R. S. Model Sr. Sec. School, Ludhiana, 30 students from Mukat Vidya Mandir Sr. Sec School, Ludhiana and 40 students were from Govt. High School Koohli Khurdh, Ludhiana. All these students were of class 9th from Ludhiana district, but students selected from schools at Sr. No. 1 and 2 were from different sections to control the effect of retention of some items of the test because same schools were also taken as sample at the time of item analysis.
7.7.2 Sample for Experimentation Stage

The population of the study was Ludhiana district of Punjab. There are many secondary as well as senior secondary schools in Ludhiana. A list of all the schools was taken. There were total 782 high and senior secondary (447 Pvt. + 281 Govt.) schools in district Ludhiana. Due to experimental nature of the study, sample was confined to single school which was selected randomly from the available list through lottery method. The selected school was Govt. High School, Khasi Kalan, Ludhiana. The school was affiliated to PSEB, Mohali. The medium of instruction was Punjabi. Two intact sections of IX class were taken; randomly one was selected as experimental group and another as control group. The size of sample for experimentation was 116 students of 9th class. Of these, 57 (Boys 35 + Girls 22) were in Experimental Group and 59 (Boys 35 + Girls 24) were in Control Group.

![Sample Split for Experimentation stage](image)

Fig. 7.1: Sample Split for Experimentation stage

7.8 DESIGN

The present study was experimental in nature. The study was designed on the lines of Non-equivalent Pretest-Posttest Control group design.

<table>
<thead>
<tr>
<th>Non-equivalent Pretest-Posttest Control Group Design</th>
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<tr>
<td><strong>Experimental Group</strong></td>
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<td><strong>Control Group</strong></td>
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</table>

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7.9 PROCEDURE

The investigator developed a critical thinking skill test. An achievement test of social science for the 9th class students was also developed. Random sampling technique was employed to select the sample school. Permission was taken from the principal of the school for conducting the experiment. Two intact sections of 9th class were taken. One group was assigned randomly to the treatment. This section was termed as experimental group and the other was termed as control group. In the first step, Critical Thinking Skill Test, Critical Thinking in Everyday Life, Social Competency Scale and Achievement Test in Social Science were administered to both the groups (N=116 students) as pretest. The experimental group was taught Social Science through Jigsaw method (with modules prepared by the investigator) for a period of Forty days at the rate of 60 min. per day. The experimentation dates were from 2nd January, 2013 to 3rd March, 2013. On the other hand, control group was taught selected topics of social science with the help of conventional method for a period of Forty days at the rate of 60 min. per day on same dates.

Table 7.1: The schematic representation of the treatment Activity

<table>
<thead>
<tr>
<th>Phase</th>
<th>Experimental Group</th>
<th>Control Group</th>
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<tr>
<td>Phase-I</td>
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<tr>
<td>(Pre-test)</td>
<td>Achievement Test in Social Science</td>
<td>Achievement Test in Social Science</td>
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<td>Critical Thinking Skill Test</td>
<td>Critical Thinking Skill Test</td>
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<td>Critical Thinking in everyday life</td>
<td>Critical Thinking in everyday life</td>
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<td>Social competence Scale</td>
<td>Social competence Scale</td>
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<tr>
<td>Phase-II</td>
<td>Exposure through Cooperative Learning (Jigsaw Method)</td>
<td>Exposure through Traditional Method</td>
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<tr>
<td>(Treatment)</td>
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<td>Phase-III</td>
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<tr>
<td>(Post-test)</td>
<td>Achievement Test in Social Science</td>
<td>Achievement Test in Social Science</td>
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<td>Critical Thinking Skill Test</td>
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<td>Critical Thinking in everyday life</td>
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<td></td>
<td>Social competence Scale</td>
<td>Social competence Scale</td>
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</table>
7.10 TOOLS
The following tools and techniques were used to collect data in the present study:-

- **Critical Thinking Skill Test**: (Developed by the investigator) was used to assess critical thinking skills of the students.
- **Critical Thinking in everyday Life**: Developed by Mincemoyer, Perkins, Munyua (2001) and revalidated on Indian population by Malhan, A.(2011) was used to assess Critical Thinking Disposition.
- **Achievement Test in Social Science**: (Developed by the investigator) was used to assess Achievement in Social Science of the students.
- **Social Competence Scale**: Developed and validated by Rani and Sharma (2010) to assess Social Competence of the students.
- **Cooperative Learning Modules** based on Jigsaw method of cooperative learning (Prepared by the Investigator).

7.11 ANALYSIS OF DATA

Table 7.2 The objective-wise Description of Statistical Techniques

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Objective</th>
<th>Statistical Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>To develop and validate a test for critical thinking skills</td>
<td>Measures of central tendency, S.D, skewness, Kurtosis and correlation</td>
</tr>
<tr>
<td></td>
<td>To develop and validate a test for Achievement in Social science for IX class students</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>To study the effect of cooperative learning, gender and their interaction on critical thinking skill and its dimensions by taking critical thinking as a covariate.</td>
<td>8 set of 2 X 2 ANCOVA</td>
</tr>
<tr>
<td>4</td>
<td>To study the effect of cooperative learning, gender and their interaction on critical thinking dispositions by taking critical thinking dispositions as a covariate.</td>
<td>2 X 2 ANCOVA</td>
</tr>
<tr>
<td>5</td>
<td>To study the effect of cooperative learning, gender and their interaction on Social Competence and its dimensions by taking Social Competence as a covariate.</td>
<td>4 set of 2 X 2 ANCOVA</td>
</tr>
<tr>
<td>6</td>
<td>To study the effect of cooperative learning, gender and their interaction on achievement in social science by taking achievement in social science as a covariate.</td>
<td>2 X 2 ANCOVA</td>
</tr>
</tbody>
</table>
7.12 FINDINGS OF THE STUDY

1. Critical thinking skill of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

2. Gender differences were not found in Critical thinking skill of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

3. Critical thinking skill was found independent of interaction between gender and group (teaching method)

4. Analogy (1st dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

5. Gender differences were not found in Analogy (1st dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

6. Analogy (1st dimension of critical thinking skill) was found independent of interaction between gender and group (teaching method)

7. Evaluating Arguments (2nd dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and traditional method of teaching do not differ.

8. Gender differences were found in Evaluating Arguments (2nd dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching in favor of girls.

9. Evaluating Arguments (2nd dimension of critical thinking skill) was found independent of interaction between gender and group (teaching method)

10. Logical Analysis (3rd dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and traditional method of teaching do not differ.
11. Gender differences were not found in Evaluating Logical Analysis (3rd dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

12. There was significant influence of interaction between Gender and group (teaching method) on Logical Analysis (3rd dimension of critical thinking skill).

13. Interpretation (4th dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

14. Gender differences were not found in Interpretation (4th dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

15. Interpretation (4th dimension of critical thinking skill) was found independent of interaction between gender and group (teaching method).


17. Gender differences were not found in Recognition of Assumption (5th dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

18. Recognition of Assumption (5th dimension of critical thinking skill) was found independent of interaction between gender and group (teaching method).


20. Gender differences were not found in Deduction (6th dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

21. Deduction (6th dimension of critical thinking skill) was found independent of interaction between gender and group (teaching method).

22. Inferences (7th dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.
23. Gender differences were not found in Inferences (7th dimension of critical thinking skill) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

24. There was significant influence of interaction between Gender and group (teaching method) on Inferences (7th dimension of critical thinking skill).

25. There was significant difference in 3 dimensions (Analogy, interpretation and inferences) of critical thinking skill of students taught by Jigsaw method of cooperative learning as compared to traditional method in favor of Jigsaw method (cooperative learning). However, there was no significant difference on other 4 dimensions of critical thinking skill of students taught by Jigsaw method and traditional method.

26. Gender differences were not found in 6 dimensions (Analogy, Logical analysis, interpretation, recognition of assumptions, deduction and inferences) of critical thinking skill of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching. Both boys and girls do not differ significantly on critical thinking skill apart from one dimension i.e evaluating arguments 2nd (dimension of critical thinking skill).

27. There was significant influence of interaction between Gender and group (teaching method) on logical analysis (3rd dimension of critical thinking skill) and Inferences (7th dimension of critical thinking skill) and on other 5 dimensions of CTS no interaction between group and gender was found.

28. Critical thinking dispositions of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

29. Gender differences were not found in Critical thinking dispositions of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

30. Critical thinking dispositions of students were found independent of interaction between gender and group (teaching method).

31. Social competency of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.
32. Gender differences were not found in Social competency of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

33. Social competency of students was found independent of interaction between gender and group (teaching method).

34. Personal Adequacy (1st dimension of Social competence scale) of students taught by Jigsaw method of cooperative learning and traditional method of teaching do not differ.

35. Gender differences were not found in Personal Adequacy (1st dimension of Social competence scale) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

36. Personal Adequacy (1st dimension of Social competence scale) was found independent of interaction between gender and group (teaching method).

37. Interpersonal adequacy (2nd dimension of Social competence scale) of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

38. Gender differences were not found in interpersonal adequacy (2nd dimension of Social competence scale) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

39. Interpersonal adequacy (2nd dimension of Social competence scale) of students was found independent of interaction between gender and group (teaching method).

40. Communication skills (3rd dimension of Social competence scale) of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

41. Gender differences were not found in communication skills (3rd dimension of Social competence scale) of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

42. Communication skills (3rd dimension of Social competence scale) of students were found independent of interaction between gender and group (teaching method).
43. There was significant difference in 2 (two) dimensions (Personal Adequacy and Communication skills) of social competence of students taught by Jigsaw method of cooperative learning as compared to traditional method in favor of cooperative learning. No significant effect of jigsaw was found on other dimensions of social competence.

44. Gender differences were not found in all the three dimensions of social competence of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching. Boys and girls do not differ significantly on social competence.

45. There was no significant influence of interaction between gender and group (teaching method) on any dimension of social competence of students.

46. Achievement in social science of students taught by Jigsaw method of cooperative learning was significantly better than students taught with traditional method of teaching.

47. Gender differences were not found in Achievement in social science of students taught by Jigsaw method of cooperative learning and students taught with traditional method of teaching.

48. Achievement in social science of students was found independent of interaction between gender and group (teaching method).

7.13 IMPLICATIONS

The present research revealed that cooperative learning strategies are capable of improving the achievement in social science (history, geography, economics and civics), critical thinking and social competence of the students. The study has implications for students, teachers, teacher educators, administrators, psychologists, parents and the society as well.

7.13.1 Implications for the Students

When the students are taught through the traditional method like lecture method, discussion method, etc. only a sense of competition is developed. There exists a negative feeling among the students towards others as everyone wants to move ahead (even by pushing others back if required). Even the methods like project method, in which group work is done, may merely divide the students into groups to work on the problem, but doesn’t guarantee to develop a cooperative attitude among students.
them because project method does not specify any structure to form groups as specified in Jigsaw method. In the cooperative learning method like Jigsaw, the students are grouped and assigned a problem. The problem is further sub divided, so as to assign a part to each member and then everyone has to depend on the others in the group in order to know about the whole problem and its solution. In this way, positive interdependence is developed among the students. The study indicates that Jigsaw method of cooperative learning is helpful in clarification of concepts of social sciences and thus improves their achievement in social science. In their daily life cooperative learning helps the students to think about the social problems in a critical way and lend cooperation to solve the social problems. They also develop confidence to express themselves clearly and precisely in the social gatherings and in the school too. The findings of the study can also give us direction to make our classrooms a space full opportunities for the learners to work together while taking into consideration their different necessities and pace of learning. We all know that parents are the prime source of social and emotional support for children during the early childhood, but in later year’s peers commence to play an important role in the social-emotional development and gradually peers rather than parents become preferred companions, providing important sources of entertainment and support. So, for this social emotional development classroom work can be organized in groups. Cooperative learning (Jigsaw method) will provide ample opportunities for students to work together, they learn to respect their differences, helping each other to achieve their common goals in learning. Gardner (1993) also claimed in his theory about human intelligences that all of us have several capacities developed in different levels of proficiency. The point is to focus on promoting them. For promotion of different mental capacities of mind instead of cramming in classrooms, cooperative learning methods seem to offer an ideal framework to promote them.

7.13.2 Implications for the Teachers

The study may prove helpful for the teachers to improve the achievement in social science of their students. It may also prove beneficial in bringing about innovations in the social studies classroom. The teacher can utilize the cooperative learning methods for providing practice in different branches of social studies. Further, a major problem which is given due consideration in every document discussing the problems of the teachers is the problem of overcrowded classrooms or
an inappropriate teacher-pupil ratio. Cooperative learning is a fruitful solution to solve this problem. The teachers can group the students on the basis of their abilities and may use Jigsaw method, either to cover some of the topics of syllabus or for revision before the examinations. Moreover, learning through jigsaw liberates the learner and provides opportunities for the learner to go beyond the learning expectation and intellectual level of a teacher.

7.13.3 Implications for the Teacher Educators

The field of work which may be held responsible for overhauling the educational practices in the schools is Teacher Education. The teacher education institutes carry out research to study new techniques of pedagogy and try to implement it at their own level first. In collaboration with the school teachers the teacher educators can work out in a wonderful way to implement some good practices of education. National Curricular Framework for Teacher Education (2009) lays emphasis on the fact that the teachers’ role should be that of a facilitator in providing education to the students, rather than acting as an information dispenser only. To improve student performance on critical thinking and social competence along with achievement in social science, schools of education need to improve teacher training. They should teach cognitive and social skills along with academic subjects to pre-service teachers before training them to teach these skills in the classroom. They must integrate these skills into all aspects of teacher preparation and train future teachers to be models of effective thinking strategies. Schools of education may have several obstacles to overcome before accomplishing these goals, including an inadequate knowledge base on teaching these skills; a lack of consensus on methods of evaluating critical thinking and social competence; conditions that require classroom management at the cost of academic instruction; and a lack of support for cooperative learning (Jigsaw) in the institutions of education. In spite of these problems teacher educators may teach the Jigsaw method along with the other methods of teaching and use it to cover few topics of the teacher training program in order to imbibe this method of teaching in the behavior of the prospective teachers. These would-be teachers, then use this method in their respective schools in future and thereby increasing the use of the Jigsaw method manifold. Findings of this study has also
revealed that Cooperative learning (Jigsaw strategy) provide opportunities to develop above said skills. Teacher Educators can also generate resource material related to school curriculum based on jigsaw strategy.

7.13.4 Implications for the curriculum planners

National Curricular Framework (2005) recommended that knowledge should not be imparted but constructed in the classrooms. National Policy of Education (1986) recommended that to provide quality education to the people, innovative methods should be used which should develop critical thinking and creativity among the future citizens of the country. Curriculum planners and developers may use the results of the present study to incorporate the cooperative learning methods in the curriculum, thus making sure that at least certain part of the curriculum utilizes cooperative learning to enhance the achievement in social science, critical thinking and social competence of the students in the schools.

7.13.5 Implications for the school counselors

The basic elements of cooperative learning i.e. positive interdependence; individual accountability; face-to-face promotive interaction; interpersonal and small group skills; and group processing are very functional in enhancing the understanding of the students. These five terms are capable of attracting the attention of every educational psychologist or school counselors towards them. We are today witnessing that individualistic learning based on technology, electronic gadgets and social networking sites which is ultimately leading to overdependence and addiction to virtual reality. This in turn is producing an adult prone to anxiety, stress and many more psychological problems. The Jigsaw method can be fruitfully used and suggested for use by the educational psychologists or school counselors to solve the above said psychological problems of students, teachers and administrators because it facilitates socialization and catharsis of feelings through group activities using the five basic elements of cooperative learning.

7.13.6 Implications for the Parents

The present day parents are very sensitive towards their children and their education. Every parent wants his child to excel in every field of life i.e. in studies, sports, social life, etc. In this race of excellence the child finds himself stuck in the web of school, coaching centers, training centers etc. In such a situation, cooperative learning lends a helping hand to develop social qualities in the child which are
otherwise developed during the leisure time through various social interactions. It also helps the students to understand the concepts better and thus improves their achievement. Moreover, most of the co-curricular activities demand cooperative behavior from every participant to succeed. Parents may use findings of this study in framing some of the family work to enhance social competence among family members. Working as a member of the group to accomplish assigned task, students can improve their understanding among the family members. Parents can indoctrinate the social values among their wards by arranging small games in the form of jigsaw at home and in their locality.

7.13.7 Implications for the Society

In the present day society, children living in a joint family and sharing their joys, sorrows and belongings with their cousins and elders, is a rare scene. As a result, children are dissociated with skills that are developed in groups. Moreover, today’s nuclear families (in majority) are single child families, where the child is born and brought up in isolation at home. The company he has is that of toys, robots and cartoons. Most of the parents are working and there is no one at home to play and understand the feelings of the child, thus at a later stage, he is not fully able to share his belongings, adjust and express his feelings to the other children. He lacks the cooperative behavior. On the other hand, the need of the hour is teamwork, which is the only way to excel growth in the era of globalization. We are also witnessing that the world is becoming more complex and decision-making involves evaluating increasing amounts of information, it seems fitting that all institutions of education should promote the development of critical thinking. Without multiple opportunities to learn to think critically, students may simply choose to ignore much of the information available because they are overwhelmed and not well schooled in the methods and the value of critical thinking. So, to prepare such citizens who are critical thinkers as well as ready to work with others, keeping aside their personal gains, we can depend on the methods of cooperative learning like Jigsaw which guarantees the development of characteristics like social competence, critical thinking and higher achievement, which are desired qualities of a good citizen. It is also a well known fact that next decade (2020-30) will belong to the nation which posses well educated, critical thinkers and socially competent young minds. These ignited young minds will be powerful resources as compared to any other resource on the earth to transform any
developing nation into a developed nation. So, Cooperative learning (jigsaw method) can be used to produce such ignited young minds for the Indian society. The findings of the study can also be interpreted in context of global prospective of education expected by UNESCO, which aims at all round development of a child’s personality rebuilding it around the ‘Four Pillars of Education’ (learning to know, learning to be, learning to do and learning to live together). Cooperative learning provides theoretical and practical structure to realize the objectives of education as suggested by UNESCO for the 21st century. Use of Jigsaw method in schools and at home can develop the necessary conditions to reach the goal of all round development as envisaged by all the important documents. It can help to build a knowledge/learning society for developing and establishing peace and harmony in the world along with growth and development. These implications for the society can be materialized after the generalization of results of present study in Indian context. So, there is scope for further studies which are listed below.

7.14 SUGGESTIONS FOR FURTHER STUDY

- Comparative study of Jigsaw and lecture cum discussion method can be conducted by taking regular classroom as control group.
- The present study may be conducted on higher education to find the effectiveness of cooperative learning (Jigsaw method).
- Effect of different types of groups (formal, informal and cooperative base groups) can be seen on cognitive and social variables.
- The present study was delimited to some topics of social science only. The same can be replicated to other subject as science, mathematics, languages, etc.
- Longitudinal survey can be conducted in order to study the changes in students with respect to different dimensions of critical thinking skills.
- Effect of cooperative learning can be seen on other variables like anxiety, retention, problem solving and other psycho-social variables at different age groups.
- Effect of cooperative learning can be seen on different life skills at different age groups.
• There is need to compare Jigsaw with other methods of cooperative learning (like STAD, TGT, CIRC, etc) at different grade levels.
• The same study can be repeated for longer duration to examine the effect on same variables to generalize the findings.
• There is need to study effect of Jigsaw as compared to other group learning methods (like project method) on same variables.
• There is need to study the effect of cooperative learning methods on location of residence and family environment of students.
• Cooperative learning modules for content of different classes (school and college) can be developed and validated.
• There is need to study the attitude of school teachers, students, administrators and parents toward cooperative learning in Indian conditions.
• There is need to study relationship between critical thinking and critical thinking dispositions.