Abstract
Cooperative learning may be defined as a classroom learning environment in which students work together in small mixed ability heterogeneous groups on academic tasks. Cooperative learning is viewed as a means for improving student achievement and other cognitive skills. In cooperative learning each student serves as a major learning resource for each other, sharing and gathering information needed. Enjoyment and interests are the positive outcomes of this strategy. It also fosters the higher level of motivation and more interpersonal relationships, helps children to assume responsible adult roles and act on the environment creatively, reduce anxiety and ethnic tensions and increase self-esteem among the students. Successful studies of cooperative learning have taken place in urban, rural and sub-urban schools in U.S., Canada, Israel, West Germany, India and Nigeria at different grade levels from 2 to 12 and in various subjects like physics, chemistry, biology, mathematics, social sciences and language. The positive effects of cooperative learning method on student achievement appear equally frequently in elementary and secondary schools. Review of research on cooperative learning also revealed that the benefits of cooperative learning activities hold good for students at all age levels, for all subject areas, and for a wide range of tasks, such as on those involving rote-decoding, retention and memory skills as well as problem solving abilities. Realizing the importance and merits of cooperative learning techniques, these are to be necessarily strongly advocated in present day teaching in order to improve achievement of the students. Cooperative learning technique also helps to overcome the problems of conventional/traditional method of teaching. It provides solutions for the problems created due to excessive competition, large classes, short supply of learning materials, in multigrade teaching context and in mainstreaming handicapped students etc. The present paper focuses on the researches carried out to find out the effects of cooperative learning strategy on achievement in various subjects.

Keywords: Cooperative Learning, Student Achievement, Cognitive Skills, National Integration, Elementary & Secondary Schools, Conventional/Traditional Method
1 Introduction

One of the important goals of education is to develop and sustain National Integration and International Understanding. This would be possible only when there is a cooperation and coordination among and between the members of the different nations.

The concept of cooperation is very comprehensive. It is regarded as a joint activity for common goals or rewards. It’s considered as a form of social interaction among the members of a particular group who are working together towards a common end or goal. It is an universal phenomenon. In the present society, cooperation for human beings is both psychological and social necessity. Cooperation is needed in every step of our life. Most of the individual and collective goals cannot be achieved without cooperation. The physical, mental, social, emotional and spiritual needs of the individual remain unsatisfied if he does not agree to cooperate with other members of the group. All the progress that mankind has made in the various fields is because of cooperative spirit of people. Hence, cooperation helps in satisfying the needs of the individual in particular and society in general and also provides solution for most of the national and international problems.

Montagu (1965) argues that cooperation and sharing is essential for the survival of man. He says that it must never be forgotten that society is fundamentally, essentially, and in all ways a cooperative enterprise, an enterprise designed to keep men in touch with one another. Without the cooperation of its members society cannot survive and survival of man would be difficult. Vygotsky (1962) says that what children can do together today, they can do alone tomorrow. Asch (1952) and Mead (1932) also feel that in social situations cooperation is a biological necessity. Because schools socialize children to assume adult roles, and because cooperation is so much part of adult life, one might expect that cooperative activity would be emphasized in schools. To fulfill the social needs and achieve educational aims, an alternative to traditional competitive classroom is cooperative learning.

It is a method of promoting learning through students cooperation rather competition. The most common methods of teaching science in present day schools are lecture and lecture-cum-demonstration method. Both these methods stressed only on telling, memorizing and recalling information. These methods reduce the achievement of students, does not help in enhancing social relationships, curb pupils’ interest to investigate, decline the spirit of inquiry, lead to unhealthy competitive spirit. In such classrooms, students feel bored, disinterested and unhappy. This is because traditional classroom environment is competitive where students most of the time work independently and they are continually in competition with one another for grades, praise and recognition, such competition does have negative effects. Even high achievers may not achieve their best because they know that they will be near the top any way. Further, the competition for grades and recognition may set a pecking order in classroom, with high performing students at the top (Ames et. al., 1977) The process further alienates low performing students, who may turn to delinquency or withdrawal as a means of maintaining positive self-esteem in the face of what they perceive as a hostile school environment. Again present approach of instruction in classrooms is totally teacher-centered which does not provide space for dialogue and students creative expression. It considers the students as recessive receivers of information rather than knowledge creators. Hence there is a need have an alternative learning strategy which contributes for the fulfillment of social needs, educational aims and individual’s intellectual needs. Cooperative Learning is considered as one such method.
2 Cooperative Learning

Cooperative learning may be defined as a classroom learning environment in which students work together in small mixed ability heterogeneous groups on academic tasks. Cooperative learning is viewed as a means for improving student achievement and other cognitive skills (Slavin, 1984; Parker, 1985; Brophy, 1986). In cooperative learning each student serves as a major learning resource for each other, sharing and gathering information needed. Enjoyment and interests are the positive outcomes of this strategy. It also fosters the higher level of motivation and more interpersonal relationships, helps children to assume responsible adult roles and act on the environment creatively, reduce anxiety and ethnic tensions and increase self-esteem among the students.

In a cooperative learning environment, always there is a positive interdependence, students assist one another, share ideas and resources and plan cooperatively what and how to study. In cooperative learning, each group will produce one product, b) each group member will assist other group members to understand the material, c) each group member will seek assistance from his or her peers, d) no group member will change his or her ideas unless logically persuaded to do so, and e) each group member will indicate acceptance of the groups’ product by signing his or her name. In cooperative learning set up, when students are working together towards a common goal, academic work becomes an activity, valued by peers as it helps the team to succeed. In cooperative learning situation, a) students are often able to translate the teacher’s language into 'kid language' for one another, b) students who explain to one another learn by doing so. When students have to organize their thoughts to explain ideas to teammates, they must engage in cognitive elaboration that greatly enhances their own understanding, c) students can provide individual attention and assistance to one another. In a cooperative team there is a helpful, non-threatening environment in which students tryout ideas and ask for assistance and) when cooperative groups were used, the teacher observes the groups, analyzes the problems on which they work together and gives feedback to each group on how effectively they are working. Cooperative learning environment improves higher level of thinking skills and problem solving, seeks to minimize anxiety of students and competition by creating an environment where students feel safe and learn from mistakes.

3 Research on Cooperative Learning

Successful studies of cooperative learning have taken place in urban, rural and sub-urban schools in U.S., Canada, Israel, West Germany, India and Nigeria at different grade levels from 2 to 12 and in various subjects like mathematics, language arts, writing, reading, social studies and science. The effects of cooperative learning that have been studied more intensively fall into 2 categories; student achievement and student social relationships. Improved achievement was expected because in a cooperative group, students are likely to encourage and help one another to learn. Positive effects on social relationships were also expected, because cooperative learning is a social intervention; cooperation increases positive contact among individuals and puts them into a position of helping one another.

The positive effects of cooperative learning method on student achievement appear equally frequently in elementary and secondary schools. Review of research on cooperative learning has been mainly concerned with its effectiveness in comparison to traditional forms of instruction that are more competitive and/or individualistic. Sharan (1980) and Slavin (1980) concluded that, in general, there
were some significant positive effects on achievement and interracial relations that occur as a result of cooperative learning. Research also revealed that the benefits of cooperative learning activities hold good for students at all age levels, for all subject areas, and for a wide range of tasks, such as on those involving rote-decoding, retention and memory skills as well as problem solving abilities (Johnson, Maruyama, Johnson, Nelson, and Skon, 1981; Johnson, Johnson, and Maruyama, 1983). In a class with varied ability, children will have opportunities to learn from and about one another, and it is easier for lower ability students to move forward.

Slavin (1986) reviewed research and reported that 45 studies had been conducted between 1972 and 1986, investigating the effects of student team learning on achievement. Out of the 45 studies, 37 of them showed that student team learning classes significantly outperformed control group classes in academic achievement. Slavin (1987) reported that of 38 studies of at least four weeks duration, comparing cooperative methods to traditional control methods, 33 found significantly greater achievement for the cooperatively taught classes, and only 5 found no significant differences. Satyaprakasha (1998) reviewed the research conducted in the area of cooperative learning from 1980 to 1996 on different measures like achievement and found positive effect of it on the achievement measure.

The studies conducted by various researchers employing different models of cooperative learning strategy like Teams-Games-Tournaments (DeVries and Edwards, 1974). Learning Together (Johnson and Johnson, 1975), Jigsaw (Aronson et al. 1978), Student Teams Achievement Divisions (Slavin, 1978), Team Accelerated Instruction or Team Assisted Individualization (Slavin, et al. 1982) and Sharan and Sharan, 1990) in different subject areas are classified and documented under the following headings.

4 Studies related to Cooperative Learning and Achievement in Science

Humphreys (1980) studied the differential effects of cooperative, competitive and individualistic learning conditions upon the achievement, attitudes and retention of learning of junior high school physical science students during a six week experiment conducted at a sub-urban junior high school. Sample consisted of 60 ninth grade physical science students and were randomly assigned to one of the three learning groups; cooperative, competitive and individualistic. Results of the study indicated that a) the correlation of immediate learning (sum of the unit test scores) with retention test scores was significant for the cooperative and individualistic groups but was non-significant for the competitive group, b) when the subjects were stratified by ability using national percentile ranks on standardized reasoning and mathematics test, the middle ability level cooperative group attained significantly higher achievement and retention scores than did either the competitive or individualistic group of the same ability level, c) in terms of achievement and retention, the rank order for the three goal structure was a) cooperative b) individualistic and c) competitive. Results also indicated that a) change scores for the Semantic Differential indicated cooperation generated the most positive attitude change toward laboratory work and self-esteem, b) the individualistic group showed no significant change in scores towards the positive on any of the attitudes measured, c) the competitive group had two significant losses in attitude toward teachers and the process of competition.

Humphreys, Johnson, and Johnson (1982) investigated the effects of cooperative, competitive and individualistic instruction on students' achievement and attitudes of ninth grade physical science
classes. The subjects were 44 ninth grade junior high school students attending school in a midwestern sub-urban middle class community. Three conditions were included in the study; cooperative, competitive and individualistic. The data was analyzed by using analysis of covariance for achievement scores and for the attitude measures, a one way analysis of variance was conducted to test for post experimental differences. Results showed that, on the posttests, students in the cooperative condition scored higher than did the students in the competitive and individualistic conditions, and students in the individualistic condition scored higher than did the students in the competitive condition. On the retention test, students in the cooperative condition scored higher than did the students in the competitive and individualistic conditions. The results related to attitudes revealed that students were more interested in learning cooperatively, perceived it to be more worthwhile and important way to learn and felt less anxiety while learning within it. As it is evident, this study also highlighted that students have a positive attitude towards cooperative conditions and perceived it as a better way to learn than from the individualistic or competitive instruction.

Lyons (1982) compared the effects of cooperative and individualistic learning experience on a) the achievement in science, b) quality and quantity of cognitive processing, and c) relative amount of participation by high, middle and low ability elementary school students. The results indicated that the cooperative condition in which constructive controversy was encouraged, there was significantly greater achievement and significantly greater elaborative cognitive processing of the content of the learning task. Eighteen percent of the participation in the cooperative controversy condition was by high ability students, fifty seven percent by middle ability students, and twenty four percent by low ability students.

Scott (1983) investigated the effects of mixed-sex and a single-sex cooperative grouping and individualization on science achievement, attitudes, and verbal leadership of early adolescent females working in physical science. The results indicated that there were no significant differences in achievement between the three conditions; however, a tendency for mixed-sex and cooperative condition mean scores to be higher was noted. There were no differences in attitudes between individualistic and cooperative conditions. However, single-sex cooperative females had more positive attitudes toward science study than mixed-sex cooperative females. Conversely, the females in the mixed-sex cooperative condition had more positive attitudes toward the female role in science. MANOVA was performed to examine male data. There were no significant differences in male achievement, attitudes, or verbal leadership between the conditions. However, males had significantly superior achievement scores and more positive attitudes toward their own science ability than the females. They also had more task-related verbal leadership, but this difference was not significant within the mixed condition.

Okebukola and Ogunniyi (1984) investigated the effects of cooperative, competitive and individualistic science laboratory interaction patterns on students' achievement in science in the level of acquisition of practical skills. Results obtained were as follows: For the achievement data, significant main effects were obtained for interaction pattern and ability as well as for interaction. Students in the cooperative group achieved better than those in the competitive group and those in the individualistic group. No significant difference existed between the competitive and individualistic groups in achievement.

Okebukola (1985) examined the relative effectiveness of two "pure" cooperative, two cooperative - competitive and, one "pure" competitive learning techniques on students' performance in science. The results of this analysis rejected null hypothesis as it indicated that there is a highly significant difference between experimental and control groups. The five experimental and control
groups were also found to differ significantly from one another as revealed by the t-test comparing the groups. However, t-test comparing TGT and STAD failed to reach significance. The findings of the study suggested that pure cooperative as exemplified by Johnson and Jigsaw techniques, although better than traditional, may not be optimal mode of organizing instruction in science class. Pure competitive was also found that it was not suited for organizing instruction in science class and that a combination of cooperative and competitive interaction technique was regarded as the best method for instruction in science classes for fostering students’ achievement. They suggested that when there is competition between the groups, the groups work better to achieve their goals and the emphasis is on group work to compete with other groups and is evident there is an increase in achievement due to better performance of the students in the class.

Okebukola (1986a) conducted a study to find out how the problems of large classes could be tackled using cooperative learning technique. Results indicated that there is a significant difference between the experimental and control group students in performance in chemistry. Furthermore, the difference was found to be in favour of the experimental group which had been instructed by the cooperative learning technique. The experimental group also demonstrated superior mean gain in achievement in comparison with control group. This support the contention that cooperative learning is more effective in fostering students’ performance in chemistry than the traditional whole-class method of instruction.

Okebukola (1986b) attempted to determine the effects of prolonged period of cooperative and competitive relationships among students on their performance in science. Results indicated that, while no significant difference was observed between the performance of experimental (CO, CM and CO/CM) and control group students at 4 weeks, students in the CO/CM group, which was characterized by intragroup cooperation with intergroup competition, achieved significantly better than students in CO and CM groups when tested after the initial 4 week period.

Mereebah (1987) compared the effects of a cooperative learning method called Teams-Games-Tournaments (TGT) and the Traditional Teacher-Centered (TTC) method used in schools in Saudi Arabia on science achievement, attitudes, and social interaction of students in the class. Data analysis via ANOVA and MANOVA led to the following conclusions: (a) TGT cooperative learning method was significantly more effective than the TTC method in enhancing science achievement, (b) TGT method enhanced science achievement of classes of different abilities (high, average) more than TTC did, (c) both TGT and TTC classes showed positive attitudes on their attitude pre and posttests, but there was no significant difference between their attitudes on the pretest or the posttest, and (d) there was no significant difference between TGT and TTC classes as mutual attraction and helpfulness.

Sherman (1988) examined achievement in individually competitive and cooperatively reward-structured environments in two high-school biology classrooms. Results showed that the correlation between pre and post test scores for both Classes A and B pooled together was statistically significant indicating nearly 37% of the variance in posttest scores was predicted by the students' pretest scores. Results from the within subjects ANOVA indicated a significant difference in pre and posttest scores. Posttest scores were significantly greater than pre test scores for students in both treatment groups. The interaction F-ratio was used to determine differences between treatments with regard to the academic achievement. No significant difference in pretest or posttest scores between treatment groups was found. These data indicated that both cooperative and competitive techniques were effective learning strategies; however, neither strategy was superior over the other in producing achievement gains.
Watson (1991) examined the effects of cooperative learning and Group Educational Modules (GEM) on the achievement of high school biology students. Results of this study indicated that use of Group Educational Modules (GEM) can help to improve achievement of high school biology students, and that the learning approach utilized with these materials in which each student in a group participates and plays an important role appears to be effective.

Pedersen (1992) investigated the effects of cooperative framework, focusing on STS issues, on achievement and anxiety toward science. A cooperative framework with STS issues presented as the jurisprudential STS model (JP STS), was compared to an individualistic approach studying STS issues. Results indicated that there were significant differences between the treatment (JP STS controversy) and the control (individuals) for the State-Trait Anxiety Inventory, and no significant difference between the treatment and control group on achievement. The delayed posttest also proved to be no significant. The primary conclusion developed from the analysis of the data is that treatment did have an effect on dependent variable anxiety, but no effect on the dependent variable achievement.

Lonning (1993) evaluated the effect of cooperative learning on students' verbal interaction patterns and achievement in a conceptual change instructional model in secondary science. Results showed that students using cooperative learning strategies showed greater achievement gains and made greater use of specific verbal patterns believed to be related to increased learning. The results demonstrated that cooperative learning strategies enhance conceptual change instruction.

Chang and Lederman (1994) investigated the effect of the levels of group cooperation on students' achievement during a series of physical science laboratory activities. Results revealed that no significant differences on the students' final achievement were found with respect to the three instructional approaches followed by each teacher. The teacher effect was more significant than either instructional approach on managing, manipulating, observing, reading and writing behaviours. No significant teacher effect was found for the other behaviours. Only one treatment effect was significant (writing behaviours). Over all, the teacher effect was more influential than instructional approach on students' behaviours. In teacher A's classes, reading behaviour predicted 21% of students' achievement. However, no significant considerations existed between the 10 collaborative behaviours and students' achievement in teacher B's Classes.

Lazarowitz, Hertz- Lazarowitz and Baird (1994) conducted a study to investigate the impact of group mastery earning, (a cooperative learning technique) on student's academic achievement in science, creativity, self esteem and a number of friends and on the overall learning environment of the classroom. Results showed that a) students of the experimental group achieved significantly higher on academic outcomes both normative and objective scores, b) on the creative essay test, the differences in number of ideas and total essay scores were not significant between the groups, although the mean scores for number of words were higher on the individualized mastery learning group, c) on the affective domain, Jigsaw group mastery learning students scored significantly higher on self esteem, number of friends and involvement in the classroom. No differences were found in cohesiveness, cooperation, competition and attitudes towards the subject learned.

Penello (1995) compared the effects on science achievement, transfer problem solving ability, and attitudes toward the instructional experience for students using concept mapping, cooperative learning and a combination of concept mapping and cooperative learning in a unit of study. Analysis of covariance (ANCOVA) indicated no significant overall effects of treatment or gender, but inspection for effects of gender-by-treatment interaction showed that males performed better than
females and genetics measures of science achievement and transfer problem solving ability, and females performed better than males on an atomic structure measure of transfer problem solving.

Brandt (1995) examined the effectiveness of cooperative learning versus traditional non-cooperative learning on the self-esteem and academic achievement of 74 urban high school in grades 9-12 with learning disabilities in self-contained mathematics, English, English as a second language (ESL), Spanish, and Science classes. Analysis of covariance indicated no significant difference between the groups' posttest scores for both overall and academic self-esteem. The results of t-tests yielded significant differences in favour of the cooperative learning classes on standardized and criterion referenced academic achievement.

Fontenot (1996) determined if participation in a science programme of cooperative learning methods in conjunction with traditional lecture methods would result in a statistically significant difference in science achievement scores of the experimental groups when compared to those of the control groups. The results indicated that students who received instruction in a cooperative learning environment in conjunction with a traditional lecture scored higher on the variable of science achievement than did the students who had been instructed in a traditional lecture-type fashion. The results also indicated that this achievement was not related to the variables of gender, race socio-economic status, or general level of prior science achievement.

6 Cooperative Learning and Achievement in Mathematics

Huber et al. (1982) compared a form of STAD to traditional group work lacking group roles and individual accountability. The STAD group scored significantly better on maths test.

Johnson (1984) studied the effectiveness of cooperative learning model that contains elements of peer-tutoring and Group Investigation approach to cooperative learning, on students’ problem solving achievement in maths. A Quasi experimental pre-test post-test control group design was used for study. It was found that experimental group scored significantly higher than the control group.

Mevarech (1985) employed a 2X2 factorial design (teams vs individual, and mastery vs non-mastery) on 134 V grade children in one Israeli school to investigate the effects of student-teams using mastery learning strategy on mathematics achievement. Results showed higher achievement came for pupils exposed to student-teams using mastery learning strategy than those exposed to more traditional instruction.

Vani (2012) conducted a study to find out the effectiveness of cooperative learning on achievement in mathematics, achievement in mathematics of students belonging to different intellectual group in experimental group. The sample consisted of 144 IX standard students. Pre-test and post – test group design was employed in the study. The experimental group was exposed to cooperative learning strategy of learning together model (Johnson and Johnson, 1975) and the control group was taught by traditional method of teaching. The tools used were achievement test in the mathematics developed by the investigators and Ravens Progressive matrices test of Raven 1938. The statistical techniques employed were t-test and one-way Anova. The major findings of the study were 1. Cooperative learning strategy has significantly promoted achievement in mathematics with respect to knowledge, understanding, application, skill and total, in comparison to conventional method. One-way Anova results indicated that no significant difference was found in the attainment total achievement in mathematics among the students belong to different intellectual level group.
Studies related to Cooperative Learning and Achievement in Socials Science

Bjerklie’s (1995) conducted a study to find out the effect of combined instruction utilizing cognitive strategy instruction and cooperative learning. The investigator found that the students in cooperative learning group achieved higher in social studies and developed deeper understanding of the material learned.

Kosters (1991) examined whether using cooperative learning in a traditional secondary social studies classroom would have a positive effect on students’ achievement. The students of senior high school American History classes were divided into two groups i.e., experimental and control group. The pretest–posttest design was used in the study. The students of experimental group were taught through cooperative leaning (STAD) and control group was taught by traditional method. Analysis of data indicated that STAD method was found effective in promoting achievement in social studies in comparison to traditional method.

Savitha (2013) conducted a study to find out the effect of cooperative learning on achievement in history, Achievement Motivation and Anxiety. The objectives of the study were 1. Cooperative learning strategy would promote achievement in history, increase achievement motivation and decrease anxiety. Pre-test post-test equivalent group design was used. The final sample of the study consisted of 60 students of class IX out of which 30 students were considered as experimental group and remaining 30 students were considered as control group. Cluster and random sampling techniques have been used in the selection of the sample. Achievement test in history developed by the investigator has been used for the collection of data with respect to achievement in history. The statistical test employed was t-test. Results revealed that cooperative learning strategy was highly effective in promoting achievement in history in comparison to traditional method.

Studies related to Cooperative Learning and Achievement in Language

Oickle (1980) studied the effects of team reward and individual reward structures on the English achievement of 103 students from diverse communities enrolled in four American Middle school. The researcher reported positive effects in favour of the team reward structure for promoting achievement in the four schools.

Bejarano et al. (1997) found that small group cooperative practice of modified interaction and social interaction strategies improved EFL (English as a Foreign Language) learners’ communicative competence.

Sasidharan (1997) found that pupils’ taught through Jigjaw learning acquired higher achievement in Malayalam language in comparison to traditional method.

Bindhu (1999) found a positive relationship existed between cooperative learning strategy and achievement in Malayalam language skills.

Ghaith (2003), investigated the effect of Learning Together Cooperative learning model in improving English as a foreign language (EFL), reading achievement. The results revealed a statistically significant difference in favour of experimental group in EFL reading achievement.


From the review of studies related to cooperative learning and achievement, it can be concluded that studies have been conducted at middle and secondary school level, number of studies...
at primary and college level are less. All these studies have covered different subject areas like physics, chemistry, biology as well as science as a whole, mathematics, social science and language. From the review, it also becomes clear that researchers had attempted to compare the effects of different treatments like cooperative, competitive, cooperative-competitive, individualistic, traditional etc. on achievement measure. Majority of these studies highlighted the superiority of cooperative learning method over competitive/individualistic or traditional method and some studies found no significant differences between the above mentioned methods.

Realizing the importance and merits of cooperative learning techniques, these are to be necessarily strongly advocated in present day teaching in order to improve achievement of the students. Cooperative learning technique also helps to overcome the problems of conventional/traditional method of teaching. It provides solutions for the problems created due to excessive competition, large classes, short supply of learning materials, in multigrade teaching context and in mainstreaming handicapped students etc.

9 References


