Chapter 1
Conceptual Framework and
Review of Related Literature

1. Introduction:

Human beings have realized the importance of education in their lives and therefore continuous efforts are being made to improve the quality of education. In 1950 the Indian Constitution provided that all the States should provide free and compulsory education to the children of every section of the society up to the age of 14 years in ten year time. As the literacy then was quite low in India, the decision was timely, important and according to the need of the nation. The success and prosperity of a democratic system of government depends on enlightened and educated people. Equal opportunity to all is the salient feature of a demographic set up. Hence, it is necessary that all the people should get education. People become aware of their duties and responsibilities, rights and obligations only through education. Knowledge generates in them the feeling of nationalism, patriotism and sacrifices. Education changes people's behavior for better lives. According to NEP draft (2019), "Higher Education is a critical contributor to sustainable livelihood and economic development of the nation".

The recent challenge of Indian education is quality education rather just access to education. Quality in education can be brought through good researches in education field. In NEP (2019) draft, the status of research in India has been described in a delineated manner. It states that the level of R&I (Research and Innovation) investment in India have steadily dropped over the last decade i.e. from 0.84 % of GDP in 2008 to around 0.69% in 2014 and where it remains same till 2019. Since there is a clear correlation between the rates of R&I investment of nations and various measures of their prosperity, such as, GDP per capita. Following table shows countries levels of R&I investment as a proportion of GDP.

Table 1.1: Level of Research and & Innovation (R&I) Investment as a Proportion of GDP in Some Countries

Sl. No.	Country	Level of R&I investment as a proportion of GDP
i.	South Korea	4.3 %
ii.	Israel	4.2 %
iii.	Japan	3.4 %
iv.	Switzerland	3.2 %
v.	Finland	3.2 %
vi.	United States	2.8 %
vii.	China	2.1 %
viii.	India	0.7%

(Source: R&D Expenditure Ecosystem: Current Status &Way Forward, Economic Advisory Council to the Prime Minister, Gov. of India (July 2019))

In India level of R&I investment as a proportion of GDP is 0.7% which is quite low as compared to other countries. Approximately 3% investment in R&I is considered as a good investment. As the investment in R&I increases GDP will also increase. In a policy brief released by the European Union, titled 'The Economic Rationale for Public R&I funding and its Impact'(2017), it was reported that "an annual increase of 0.2% of GDP in R&D investment would result in an annual increase of 1.1% in GDP - a fivefold return" (as cited in NEP (2019) draft). Following table shows number of researchers per lakh of population:

Table 1.2: Number of Researchers Per Lakh of Population in Some Countries

Sl. No.	Country	Number of Researchers Per Lakh of Population
i.	Israel	825
ii.	United States	423
iii.	China	111
iv.	India	15

(Source: Economic Survey of India 2016-17, cited in NEP (2019) draft)

Following table shows the number of patent applications made by some countries.

Table 1.3: Number of Patent Applications Registered by some Countries

Sl. No.	Country	Number of Patent Applications
i	China	13,38,503 (With just 10% being made by non-resident Chinese)
ii	United States	605,571
iii	India	45,057 (with 70% being made by non-resident Indians)

(Source: World Intellectual Property Organisation (WIPO), as cited in NEP (2019) draft)

The above two tables' show that the situation of India needs to improve in Research and research related activities like, number of patents and research publications. Though the scientific research publications has grown from 3.1% in 2009 to 4.4% in 2013 but USA and China published at least four times as many articles as India in 2016 (as cited in NEP (2019) draft) . So a great responsibility must be felt by our researchers to improve this situation of research and research related activities in our country.

Since many researches have already been conducted in the field of education but still there is plenty of scope to bring improvement. One of the means to bring quality in education is through the quality in educational researches.

1.1. **Educational Research**

For bringing refinement and novelties in the area of Education researches have a huge role. Research means a scientific and systematic search for pertinent information on a specific topic. The researches in the field of Education are known as educational researches. According to Advanced Learner's Dictionary of Current English (1952), "a careful investigation or inquiry specifically through search for new facts in any branch of knowledge" is termed as research (as cited in C. R. Kothari, 2010). Educational research is the systematic application of a family of methods that are employed to provide trustworthy information about educational problems. In the view of Gay and Airasian (2000), "Research is usually an ongoing process, based on many accumulated understandings and explanations that, when taken together, lead to generalizations about educational issues and ultimately, to the development of theories". An exhaustive definition of research is given by Kerlinger (1986) which states that "scientific research is a

systematic, controlled, empirical and critical investigation of hypothetical propositions about the presumed relations among natural phenomena". The fundamental purpose of educational research is to increase our understanding of educational processes, practices and issues. For most of the history of educational research, the methods of science have been used to obtain these understandings. There are well defined, widely accepted procedures for stating research topics, carrying out the research process, analyzing the resulting data and verifying the quality of the study and its conclusions. Mostly, the accepted research procedures were based on quantitative approach for conducting and obtaining educational understandings. Quantitative methods of research are based on collection, presentation, analysis and interpretation of numerical data which is usually obtained from tests, rating scales, checklists, questionnaires and other formal paper pencil instruments. But quantitative approach entails more than just the use of numerical data. It also involves, stating both the hypotheses studied and the research procurers that will be implemented prior to conducting the study, maintaining control over the contextual factors that might interfere with data collected, using large enough samples of participants to provide statistically meaningful data employing data analysis relying on statistical procedures. Quantitative researches generally have little personal interaction with the people they study, since most data are gathered by using paper-pencil, structured, non-interactive instruments. The assumption underlying quantitative research methods is that we inhabit a relatively stable, uniform and coherent world that can be measured, understood and generalized about. This view, which the field of education adopted from the natural sciences, holds that the world and the laws that govern it are relatively stable and predictable and these can be understood by scientific examination. Therefore this approach to research has been and continues to be the dominant in the field of education.

The non-quantitative approaches to educational research have also emerged. These methods of research are generally called qualitative, which are based on collection and analysis of non-numerical data such as observations, interviews, field notes, focus group discussions and other more discursive sources of information. Qualitative research methods are based on different beliefs, assumptions and purposes than quantitative research methods. Qualitative research does not accept the view of a stable, coherent and uniform world. They believe that meaning is situated in a particular perspective or context and since different people and groups often have

different perspectives and contexts, there are many different meanings in the world, none of which is necessarily more valid or true than another. In this present study the investigator has dealt with only quantitative data analysis techniques of research. In quantitative data analysis techniques of research statistical data analysis techniques were used.

In education field the formal learning experiences in educational research can be obtained from M.Ed. degree programme. According to CASE (2013) the general objectives of studying Methodology of Educational Research (A) and (B) papers in M.Ed. degree course were:

i. Students will know the broad canvas of Educational Research.
ii. Students will appreciate the scope of Educational Research.
iii. Students will know the knowledge generation in Historical Perspective.
iv. Students will know variety of Research Approaches.
v. Students will understand the relevance of different approaches.
vi. Students will be familiar with the variety of research methods (Design, Sample, Tools and Data Analysis Techniques).
vii. Students will be familiar with the framework of operation of Research proposal.
viii. Students will develop understanding and skills in using various quantitative and qualitative techniques of data analysis.
ix. Students will develop understanding and skills to interpret a given set of data after analysis.
x. Students will develop competencies in Research Reporting.
xi. Students will develop abilities to understand Research when reported.
xii. Students will critically examine certain issues which make Educational Research a challenging task.

1.2. Data Analysis Techniques in Educational Research:

In education both quantitative and qualitative developments are required and therefore nowadays quality in educational researches is one of the most burning topics. Since quality of educational researches depends on many factors like

- Aptitude of the researcher
- Attitude of the researcher towards the research problem
- Prior knowledge and understanding of the selected area of discipline

- An appropriate selection and use of tools of data collection in the research
- An appropriate knowledge, understanding and application of data analysis techniques (quantitative and qualitative data analysis techniques) in the research
- Cooperation and support from parents, teachers, department, university and society.

Among all the factors mentioned above appropriate knowledge, understanding and application of data analysis techniques is one of the most important factor. The proper knowledge and understanding of data analysis techniques to the researcher can be seen from the various attempts that government is taking like:

- In all competitive exams like SSC, IFS, IAS, GPSC, IPS, ISS, IES one major component is quantitative data analysis techniques.
- In UGC NET exam one major component is quantitative data analysis techniques.
- In Ph.D. Course work one compulsory paper is on quantitative data analysis techniques.
- In all academic entrance exams one major component is quantitative data analysis techniques.
- In most of job entrance exams one major component is quantitative data analysis techniques.
- At most of Post graduate degree programmes one compulsory paper is on quantitative data analysis techniques.
- In various eligibility tests like PET, TET, TAT, HTAT, CTET one major component is quantitative data analysis techniques.

All such reasons are enough to visualize the significance of learning of quantitative data analysis techniques by the researcher or for would be researchers. So it is high time that some measures should be taken to improve the teaching- learning process of quantitative data analysis techniques. The intent is to come up with innovative and effective teaching-learning strategies in order to help and motivate students to learn efficiently. One such strategy which is being largely supported and promoted today is group learning.

According to UNESCO report of the International Commission on Education for the Twenty-first Century (1996), “Education must be organized around four fundamental types of learning, which, throughout a person’s life will be in a way the pillars of knowledge: learning to know,

that is acquiring the instruments of understanding; learning to do, so as to be able to act creatively on one's environment; learning to live together, so as to participate and co-operate with other people in all human activities; and learning to be, an essential progression which proceeds from the previous three". This clearly states that education should be imparted in such a manner so that students can appreciate human diversity, uniqueness, similarities and interdependence of people working together. In order to think creatively it is necessary for the students to focus on innovations and discoveries of peoples in different disciplines in the early stage of education, so that they could be inspired and motivated for some creative work.

Moreover it is the responsibility of teachers to provide such learning environment where dialogue and discussion could be made possible properly. This could be achieved by making proper groups and assigning common projects. One such strategy following all these aspects is Cooperative learning. According to Kerlin (1992) "The concept of cognitive engagement styles has a number of important implications for learning and teaching and these ideas are considered within the context of cooperative learning. Theory of cognitive engagement styles is not only viable but is a desirable approach to use when examining the learning processes employed adults". The foundation of Cooperative learning believes that learning is most effective when students are actively and dynamically involved in sharing of their ideas and work cooperatively to complete their academic tasks.

1.3. Cooperative Learning:

In order to teach effectively the teacher must have the knowledge about the subject, appropriate methods of teaching and never the less but sufficient knowledge about the students. Modern researches indicate that if appropriate methods and techniques are used in teaching learning process, even the students of less intelligence can easily learn. Competencies of students can be developed and enhanced in group works. In this study the investigator is focusing on one such strategy that is cooperative learning. Let us first understand the meaning of cooperative learning and then its various types and techniques.

Cooperation means working cohesively in a cooperative situation to accomplish shared goals within group and individuals seek outcomes that are beneficial to themselves and to all other group members. The terms group learning and cooperative learning are often used as if they mean the same thing. In fact, group work means several students working together and working

together does not necessarily involve corporation. From kindergarten to colleges and across different subjects it is recognized that Cooperative learning promotes socialization and also enhance learning among students.

According to Johnson, Johnson and Salvin (1975, 1987, 1987), cooperative learning is an instructional technique that requires students to work together in small, fixed groups on a structured learning task (as sited in James Cooper, Susan Prescott, Lenora Cook, Lyle Smith, Randall Mueck and Joseph Cuseo, 1990).

According to McCulloch (1985), cooperative learning refers to students working together to achieve a common goal. In addition to the usual learning goals, it also includes the goals of establishing a collaborative/helping relationship among participants.

The U.S. Departmenr of Education Office of Research (1992) has defined cooperative learning as a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere of achievement.

According to Johnson, Johnson & Holubec (1998), cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning.

According to Slavin (2000), cooperative learning activities are carefully structured learning activities in which students are held accountable for their contribution, participation and learning. Students are also provided incentives to work as team in teaching others and learning from others.

According to Woolfolk (2001), cooperative learning is an arrangement in which students work in mixed ability groups and are rewarded on the basis of the success of the group as a whole.

Felder & Brent (2007) says that the term cooperative learning refers to students working in teams on an assignment or project under conditions in which certain criteria are satisfied, including that the team members be held individually accountable for the complete content of the assignment or project.

Among all the above mentioned definitions the most widely used definition of cooperative learning in higher education is probably that of Johnson & Johnson (1995). According to them, cooperative learning is an instruction that involves students working in teams to accomplish a common goal, under conditions that include the following six essential elements:

I. The first element is **Positive Interdependence**. In simple words the positive interdependence means that a gain for one student in a group is associated with the gains for the other students in the same group. The discipline of using cooperative groups begins with structuring positive interdependence. It is positive interdependence that requires group members to work together to accomplish something beyond individual success. In cooperative learning each group member is required not only to complete his or her goal but also ensure that other does likewise if the group is to achieve its goal and the technical term for this dual responsibility is called as positive interdependence. Deutsch's (1949) work on interdependence was extended by Johnson and Johnson (1990) and suggested that there are two types of interdependences, namely outcomes interdependence and means interdependence. Outcomes interdependences exists when students are striving to achieve a common goal for their efforts and means interdependence exists when students needs to share resources, fulfill different roles or complete tasks in order to achieve the group's goal.

II. The second element is **Equal participation**. In simple words equal participation means that no student should be allowed to dominate a group or an individual either socially, physically, emotionally or academically. Every student must participate and give opportunity to others to participate in the process of learning while progressing for the attainment of common goal. This element is more important in the sense that students socialization and students hidden potential for cohesive learning can be utilized at its maximum form of appearance where they encourage each other to participate and ready to listen among themselves with mutual respect and faith.

III. The third element is **Individual Accountability**. Individual accountability means that when group member's accepting as a personal responsibility of their contributions for the attainment of their common goal. This further suggests that one should not only be responsible for completing individual's tasks but also ensure that other should also complete it well. Therefore, individual accountability exists when the performance of each individual member is assessed and the results are given back to the individual and to the group too, so as to compare with a standard of performance and the member is held responsible by group mates for contributing his or her fair share to the group's success. It has also been suggested that when positive interdependence is well structured in a group,

students will feel more personal responsibility for contributing to the collective efforts and be less likely to freeload on the efforts of others.

IV. The fourth element is **Face to Face Promotive Interaction**. In simple words face to face promotive interaction in cooperative groups means that group members meet face to face to work together to complete their assignments and tasks. Students also encourage and prop up each other's success. Sometimes a piece of the group work may be taken out at home and done individually, but most of the work must be done interactively with group members provide one another with feedback, challenging reasoning & conclusions and perhaps most importantly teaching, facilitating and encouraging one another in the group. Students carryout this through sharing of information and giving assistance, constructive feedback to help improve performance and access to resources and study materials needed to accomplish tasks. When students interact among themselves they learn to use contextual language to explain their ideas and experiences, negotiate meaning around a task and develop new ways of thinking and behaving.

V. The fifth element is **Appropriate Use of Collaborative Skills**. Cooperative learning is comparatively more intricate than competitive or individualistic learning because students have to engage in different tasks and teamwork simultaneously to coordinate efforts that will achieve their mutual goals. Here students are encouraged and helped to develop and practice trust-building, leadership, decision-making, communication, and conflict management skills. For effective use of cooperative learning technique one should train students to make proper use of small group and interpersonal skills while working in groups. If students were not trained in advance about such interpersonal and small group skills chances are more of creating conflicts and chaos among the members of groups. Therefore students need to know in prior about these Interpersonal skills like actively listening and trusting each other, stating ideas or thoughts freely, accepting responsibility for one's behaviors and providing constructive criticism or feedback. Whereas small group skills are also equally important like taking turns of the members for reflecting or interacting, sharing tasks, making decisions democratically, trying to understand other student's perspectives, clarifying differences and solving conflicts constructively.

VI. The sixth element is **Group Processing**. Under Group processing basically two important actions are considered first is to describe which member actions were desirable/helpful and undesirable/unhelpful in the process of completing the common task and second is to make decisions about which actions to remain as continue or change. Team members draw their group goals and assess them frequently about what they are doing well as a team. Then they identify changes which will make to function more effectively in the future. Group processing ensures that students should involve themselves in the group engagement properly and should also perform at least in one of the three social skills i.e. summarizing group member's thoughts, ideas and information; encouraging members to participate in group discussions and interact; verifying that the decisions made by the group must be supported by their members.

Cooperative Learning is not merely working in groups but it is more than that. Say learning exercise which qualifies the above mentioned six elements is considered as Cooperative Learning. Therefore following are the chief characteristics of Cooperative Learning:

- Active Participation of Learners ;
- Mutual exchange of knowledge between Teachers and learner, sometimes learners act like teacher and teacher act like learners;
- Every student exhibit mutual respect towards all other members;
- Assignments, tasks and questions enhance interest and challenge among students;
- Individual differences and diversity is celebrated and all efforts are appreciated;
- Students learn adjustment skills and they also manage group conflicts when they arise;
- Students use their past experience and knowledge to work collectively;
- Students lead themselves and they define clear goals which act as a guide to them;
- Students invest in their own learning.

From the above mentioned characteristics of Cooperative Learning difference between traditional classroom and cooperative classroom can be described as follows:

Table 1.4: Comparison of Traditional Classroom with Cooperative Classroom

Traditional Classroom	Cooperative Classroom
Interacting with neighbors is discouraged.	Interacting with neighbors is encouraged.
Completing task alone and let others also do on their own.	Completing task with the help of group members so that work you do together becomes better than the sum of its parts.
Looking into their own notebook.	Looking into the peer's notebook in order to learn from them, help them and for sharing ideas and thoughts.
In trouble seeking help from teacher.	In trouble first seeking help from their own group mates and at last from the teacher.
Seeking teachers and friends attention.	Every member gets chance to participate in the task accomplishment and in the presentation too.
Students compete for extrinsic rewards like praise by teachers and grades.	Students get extrinsic as well as intrinsic rewards.
Less scope for developing humane values.	More scope for developing humane values.
Student feels classmates as competitors.	Student feels classmates are as resource.

According to Yale Sharan and Prof. Robyn Gillies (2011) well structured Cooperative Learning procedure enables students of diverse backgrounds and cultural heritages to contribute to everyone's learning, based on their competencies, experiences, knowledge and understanding of the world. Sahlberg reminds us, "Cooperative learning…is the best way to educate young people for a diverse competitive world".

While discussing on Cooperative Learning sometimes we confuse with a term known as collaborative learning. Let us first clear the difference between them. According to Panitz (2011), "Collaboration is a philosophy of interaction and personal lifestyle where individuals are responsible for their actions, including learning and respect the abilities and contributions of their peers; Cooperation is a structure of interaction designed to facilitate the accomplishment of a specific end product or goal through people working together in groups".

According to Gerlach (1994), "Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves. It is through the talk that learning occurs." Many times teacher does not have a pre-set notion of the problem or solution that students will be researching. It is a method of teaching and learning in which students' work in team together to explore a significant query to create a meaningful concept and hence a Knowledge. A group of students discussing a lecture or students from different schools working together over the Internet on a shared assignment are both examples of collaborative learning.

In Cooperative learning students work face to face in small groups where groups are guided with clear objectives and students are engaged in various activities that improves their understanding and knowledge in that area to explore. Students structure their activities by their own and they are individually accountable for their success as well as failure. In a group either all will swim or all will sink together. Students enhance their interpersonal skills, adjustment skills and conflict resolving skills in a very positive manner. In small groups students can share their strengths and work upon their weaker skill to improve them.

For creating Cooperative environment for learning three things are important to consider. First, students should be ready to learn, feel safe and simultaneously enthusiastic to accept the challenges. Second, the size of groups should be small (preferably of 4, 5 or at most of 6 members) so that everyone in the group can contribute. Third, student's tasks in the group must be clearly defined and well communicated.

According to George M. Jacobs, Michael A. Power and Loh Wan Inn (2006) students can benefit from Cooperative Learning in the various areas like their academic achievements grow irrespective of their past achievement level or individual learning needs; students participation also increased and become live & active; students self esteem and motivation also enhanced; students realized for shouldering the responsibility of their own learning; students improved their social, interethnic relations and positive outlook developed for academically weak students; students develop skill of time management and so improve on task's time, students improved their collaborative skills; students improved their attitudes toward learning, school, peers, and self; students has increased the ability to appreciate and consider other's perspectives; greater opportunity for teachers to assess the students while learning and for the learning .

On the similar lines, Slavin (1995) has also drawn suggestion to incorporate Cooperative Learning in the educational practices. Following are the chief reasons:

- Ample number of researches shows that the use of Cooperative Learning improves student's achievements. Moreover there are some more supplement outcomes like inter-group relations, acceptance of physically challenged students and increased self-motivation and self-esteem.
- This is widely realized that people must learn to think, solve problems, integrate their knowledge and apply their skills. For this Cooperative Learning is an absolute means.
- Cooperative Learning takes opportunity to consider diverse or heterogeneous class as a resource rather than a problem. When schools are constructing heterogeneous ability grouping instead of homogeneous ability grouping it shows that Cooperative Learning is growing.
- Cooperative Learning has been found to positively influence the social relations of students of different ethnic backgrounds and mainstreamed special education students and their classmates.

1.3.1. Cooperative Learning types:

According to Johnson & Johnson (1998), there are three ways that Cooperative Learning may be employed.

a. **Formal Cooperative Learning** groups may run for one class to few classes or even for couple of months to accomplish any course requirement such as assignment work, practical works, project work, material development, workshop assignments, solving problems, report writing, conducting experiments, conducting surveys, preparing module, learning vocabulary, working exercise given at the end of the chapter etc. The teacher orients the lesson, make small groups of students (say 2 to 6 members in each group), distribute the related study material to the students which help them in completing their tasks, allot the assignment to each group and assign the students role need to perform. Then students work on their allotted tasks with their group mates until they succeed and completely understood it. When students perform their tasks, teachers supervise them monitor their interactions. In case students face difficulty in understanding the task or some conflict occurs among the students, teacher intervenes and helps them to work conducively. After the completion of their allotted task for each group evaluation proceeds by the teacher. Evaluation includes individual as well as group performance for

their performed task. While working cooperatively, students realize that they are mutually responsible for each other's learning and have a stake in each other's success.

b. **Informal Cooperative Learning Groups** are temporary in its nature. They last for a very short time may be for few minutes or for a class. The purpose of such groups is to bring the kind attention of students, to encourage them for cognitive process, to create conducive learning environment or to provide the closure to an instructional session. Such groups are also used to break the monotonous mechanism of learning in class like in lectures and demonstrations.
c. **Cooperative Base Groups** exists for a longer period of duration. It may be for a semester, year or an entire academic degree programme. In these groups the members remain stable and give all support, encouragement and assistance to one another for achieving al their academic goals. Through such groups students develop academically as well as socially and emotionally.

1.3.2. Cooperative Learning Techniques:

There are many techniques by which Cooperative Learning strategies can be employed in classrooms. Which helps the teacher to bring harmonious interaction in the classroom during the learning time and it also helps the students to learn content effectively and joyfully. Following are some of the common techniques which are used in different classrooms as Cooperative Learning techniques:

i. **Student Teams-Achievement Divisions (STAD) -** This technique was developed by Slavin (1994), in which students are assigned to four-member learning teams that are mixed in performance level, gender, and ethnicity. The teacher presents a lesson, and then students work within their teams to make sure that all team members have mastered the lesson. Finally, all students take individual quizzes on the material, at which time they may not help one another. Students' quiz scores are compared to their own past averages, and points are awarded on the basis of the degree to which students meet or exceed their own earlier performance. These points are then summed to form team scores, and teams that meet certain criteria may earn certificates or other rewards. In a related method called Teams-Games-Tournaments (TGT), students play games with members of other teams to add points to their team scores.

ii. **Cooperative Integrated Reading and Composition (CIRC) -** This technique was developed by Stevens & Slavin (1995). CIRC is a comprehensive program for teaching reading and writing in the upper elementary grades. Students work in four-member Cooperative Learning teams. They engage in a series of activities with one another, including reading to one another, making predictions about how narrative stories will come out, summarizing stories to one another, writing responses to stories, and practicing spelling, decoding, and vocabulary. They also work together to master main ideas and other comprehension skills. During language arts periods, students engage in writing drafts, revising and editing one another's work, and preparing for publication of team books.

iii. **Jigsaw -** This technique was developed by Aronson, Blaney, Stephen, Sikes, & Snapp (1978), where students are assigned to six member teams to work on academic material that has been broken down into sections. Each team member reads his or her section. Next members of different teams who have studied the same sections meet in expert groups to discuss their sections. Then the students return to their teams and take turns teaching their teammates about their sections. Since the only way students can learn sections other than their own is to listen carefully to their teammates, they are motivated to support and show interest in one another's work. In a modification of this approach called Jigsaw II developed by Slavin (1994), students work in four- or five-member teams, as in STAD. Instead of each student being assigned a unique section, all students read a common text, such as a book chapter, a short story, or a biography. However, each student receives a topic on which to become an expert. Students with the same topics meet in expert groups to discuss them, after which they return to their teams to teach what they have learned to their teammates. The students take individual quizzes, which result in team scores, as in STAD.

iv. **Learning Together -** Learning Together, a model of Cooperative Learning developed by David Johnson and Roger Johnson (1999), involves students working in four- or five-member heterogeneous groups on assignments. The groups hand in a single completed assignment and receive praise and rewards based on the group product. This method emphasizes team-building activities before students begin working together and regular discussions within groups about how well they are working together.

v. **Group Investigation -** This technique was developed by Sharan & Sharan (1992). Group investigation is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning and projects. In this method, students form their own two- to six-member groups. After choosing subtopics from a unit that the entire class is studying, the groups break their subtopics into individual tasks and carry out the activities that are necessary to prepare group reports. Each group then makes a presentation or display to communicate its findings to the entire class.

vi. **Cooperative Scripting:** Many students find it helpful to get together with classmates to discuss material they have read or heard in class. A formalization of this age-old practice has been researched by Dansereau (1985) and his colleagues. In it, students work in pairs and take turns summarizing sections of the material for one another. While one student summarizes, the other listens and corrects any errors or omissions. Then the two students switch roles, continuing in this manner until they have covered all the material to be learned. A series of studies of this cooperative scripting method has consistently found that students who study this way learn and retain far more than students who summarize on their own or who simply read the material (Newbern, Dansereau, Patterson, & Wallace, 1994). It is interesting that while both participants in the cooperative pairs gain from the activity, the larger gains are seen in the sections that students teach to their partners rather than in those for which they serve as listeners (Spurlin, Dansereau, Larson, & Brooks, 1984).

1.4. Historical Background of Cooperative Learning

Educational practices are greatly influenced by learning theories and learning theories are again influenced by researches' in psychology. During late 19th century to mid 20th century Behaviorist learning theories arouses by Pavlov (1897), Watson (1913), Thorndike (1905), B.F. Skinner (1936), Hull (1943) and Chomsky (1959). According to them all behaviors are acquired through conditioning and conditioning occurs through interaction with the environment and behaviorists also believe that our responses to environmental stimuli shape our actions. Soon behaviorist learning theories were eclipsed by social learning theories of Albert Bandura in the year of 1963. According to Bandura people learn from one another through observation,

imitation and modeling. Soon after social learning theories, cognitive learning theories emerged. This Bandura's theory is often considered as a bridge between behaviorist and cognitive learning theories because it encompasses attention, memory and motivation. Johnson & Johnson (1998) states that Cooperative Learning is evolved basically on three major theoretical perspectives namely behavioral perspective, social interdependence perspective and cognitive-developmental perspective.

Cognitive Developmental Theory: At cognitive development theory the major contributions were of Jean Piaget and the Lev Vygotsky. According to Jean Piaget when individuals cooperate on an environment, socio-cognitive conflict occurs thus creating cognitive disequilibrium which in turn stimulates perspective-taking ability and reasoning and hence cognitive development occurs. In the similar lines Lev Vygotsky describes that cognitive development is a result of social interaction. That is knowledge as a societal product where cognitive abilities are socially transmitted, socially constrained, socially nurtured and socially encouraged. Therefore cognitive development theories suggest that social interaction is a major factor which leads to cognitive development of an individual and also make links between communication and internal thought process of an individual.

Behavioral Learning Theory: At Behavioral learning theory the major contributions were of Skinner (group contingencies), Bandura (imitation),Homans, Thibaut & Kelley (balance of rewards and costs), Mesch-Lew-Nevin (specific application to Cooperative Learning). The behavioral-social perspective presupposes that cooperative efforts are fueled by extrinsic motivation to achieve group rewards (academic and/or nonacademic).

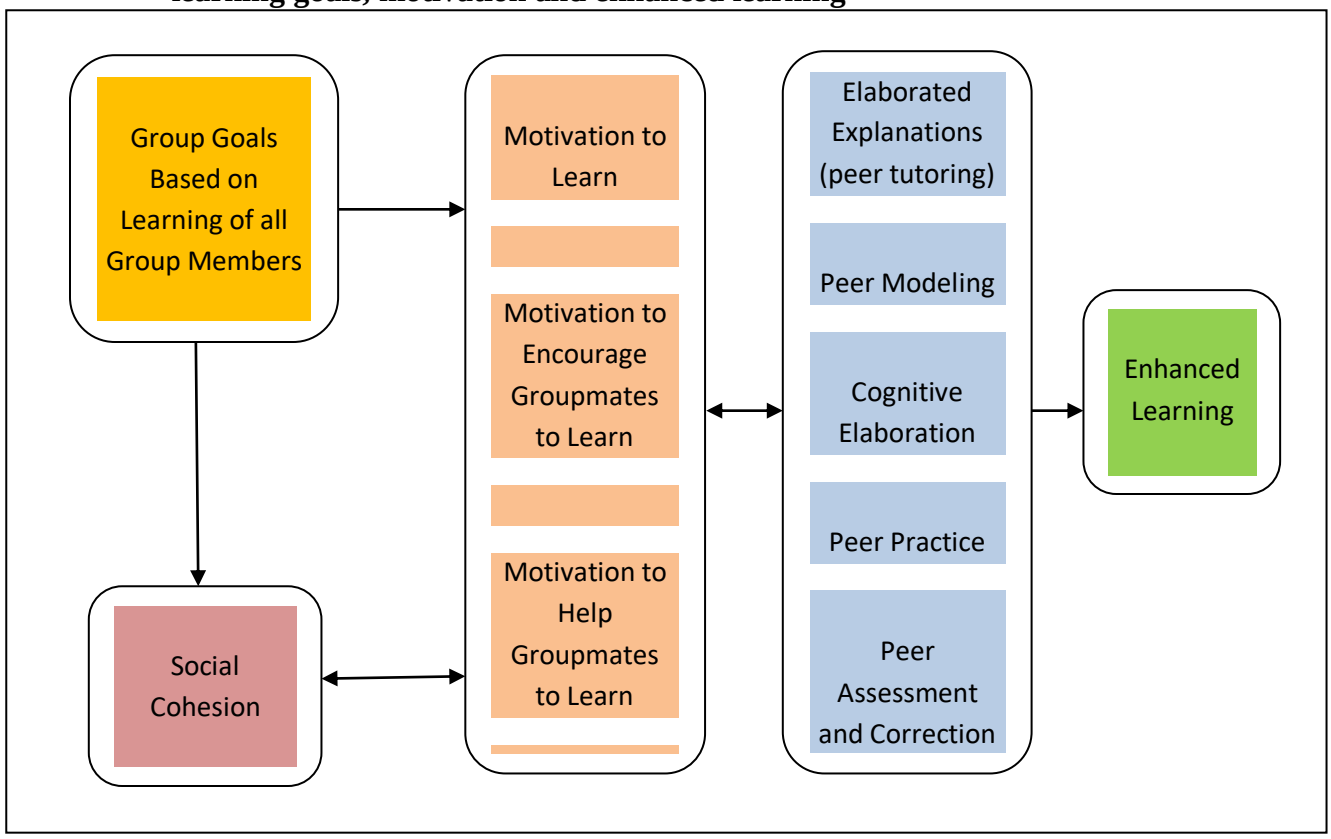
Social Interdependence Theory: At social interdependence theory the major contributors were Kurt Koffka (1910) described that the whole is greater than the sum of its parts and where groups are dynamic wholes member interdependence; Kurt Lewin (1935) extended the Koffka notions and found that behavior is the result of the individual and the environment, Morton Deutsch (1949, 1962) continued on the work of Lewin and states that the absence of social interdependence and dependence results in individualistic efforts. Cooperation exists when individuals work together to accomplish shared goals. The three types of Interdependence could be positive interdependence, negative interdependence and no interdependence. Here in

education perspective social interdependence is an essential component in teaching learning process which means that student's collective efforts to achieve a goal, develop positive outlook for their group members, develop good relationship and trusting group members, adjusting psychologically and practice social competences. Therefore it can be understood that the way social interdependence is structured determines the way persons interact with each other and the outcomes are the consequences of students' interactions. Hence, one of the cooperative elements that have to be structured in the classroom is positive interdependence i.e. cooperation which enhance the promotive interaction within the group and encourage the students to work collectively to accomplish the goal.

Johnson, D. and Johnson, R. (2009) described that the researches on Cooperative Learning majorly focused on three areas of students i.e. (i) efforts to achieve (ii) pro-social behavior and social support and (iii) psychological health and self esteem. According to fell into three major areas related to students. Whereas Celeste M. Brody (2011) stated that before Cooperative Learning needs to apply in the classroom, teachers are expected to increase their knowledge of their subject matter; increase their ability to observe students; make stronger connections between daily practice and term goals; improve their sense of efficacy and personal motivation; and improve their collegial networks. It is the responsibility of each educational institution to built and use their own its social capital for educational growth. Mcwhaw, Schnackenberg, Sclater, and Abrami (2003) found that students at the college level had much to gain from this approach to learning provided they had been trained to work constructively together, understand the purpose of the activity, believed the group product was attainable and their own contributions were important and the physical and psychological demands placed on the group were not excessive. In a comparative study, experiences of college students during Cooperative Learning and large group instruction, Peterson and Miller (2004) reported that Cooperative Learning can lead to greater cognitive involvement; higher levels of motivation, including higher engagements; greater perceived importance of the tasks; and more optimal levels of cognitive challenge in relation to skill. Johnson, Johnson, & Stanne (2000) reported that Cooperative Learning experiences are crucial to preventing and alleviating many of the social problems related to children, adolescents and young adults. Slavin (1995) depicted a functional relationship among group learning goals, motivation and enhanced learning which describes how

Cooperative Learning helps in enhancing learning among the students. Following figure describes this relationship:

Figure 1.1: Mechanism of Cooperative Learning: functional relationship among group learning goals, motivation and enhanced learning



(Source: Adapted from Slavin (2011). Instruction based on Cooperative Learning . In Dr. Lam Blok Har (Ed.), A Class: The Active Classroom. The Hong Kong Institute of Education.)

From the above figure motivation to success directly leads to enhanced learning. This also facilitates behavior and attitude change of the students which fosters group cohesion, group interactions, equilibration and cognitive elaboration and hence leads to better understanding, learning and academic achievements.

1.5 Role of Teacher in a Cooperative Classroom:

According to NEP (2019) draft, "curriculum, pedagogy, and student support are the fundamental requirements for quality learning; infrastructure, resources, technology, etc., while important, are merely the means for supporting these necessary ingredients". Further it is added that "Each institution must also be committed to holistic development of students, and create strong internal

systems for supporting diverse student cohorts in academic, social and interpersonal domains – both inside and outside formal academic interactions in the classroom. Faculty must have the capacity and training to be able to approach students not just as teachers in the classroom, but also as mentors and guides". Therefore in this contemporary education role of teachers become dynamic. For an effective cooperative classroom certain pedagogical practices should be carried out by a teacher. According to Robyn M. Gillies (2007) following practices should be included in a Cooperative classroom:

- Recognizing that students need to work on complex and interesting tasks.
- Using a verity of sources to stimulate students' interests.
- Modeling the types of talk they want students to use.
- Encouraging students to dialogue together.
- Creating opportunities for students to collaborate and problem –solve around tasks.
- Promoting higher order thinking.
- Ensuring learning is student-centered.
- Encouraging students to accept responsibility for their own learning.
- Providing students with explicit feedback on their progress.

It is the responsibility of a teacher that not even a single student can leave behind in the class. Therefore teaching must be carried in such a way that all students must get an opportunity to come out of their own barriers and learn in an academic learning environment. It is the pivot responsibility of the teacher to make best use of the social capital in its class for achieving their academic goals. From review of studies Taylor, Pressely and Pearson (2000) studied that effective teachers in contrast with less effective teachers had higher student engagements, provided smaller group instructions, had a preferred teaching style of coaching or facilitating as opposed to telling students what to do and asked higher level comprehension questions or questions designed to encourage students to think. Moreover, teacher should emphasis more on higher order meaning making and opposed to lower order thinking skills, then the instructions will be more effective. According to Gillies (2007) following are the key responsibilities of a teacher in a Cooperative Learning classroom:

i. To ensure that groups are structured so that key components (positive interdependence, simultaneous and promotive interaction, equal participation, individual accountability, interpersonal and small group skills and group processing) are evident.

ii. To determine the size, the ability and gender composition of the group.
iii. To set a task that will encourage the students to interact together.
iv. To ensure that tasks that are set are inclusive of all students.
v. To inform the class of the group experience and discuss with them clear expectations of acceptable behavior, including task-focused behaviors and interpersonal behaviors.
vi. Students need to understand that they have responsibilities both to themselves and to their group members when they work together.
vii. Students need to be taught to monitor the group's process, including their own contributions, as well as how well the group is maintaining effective working relationships.

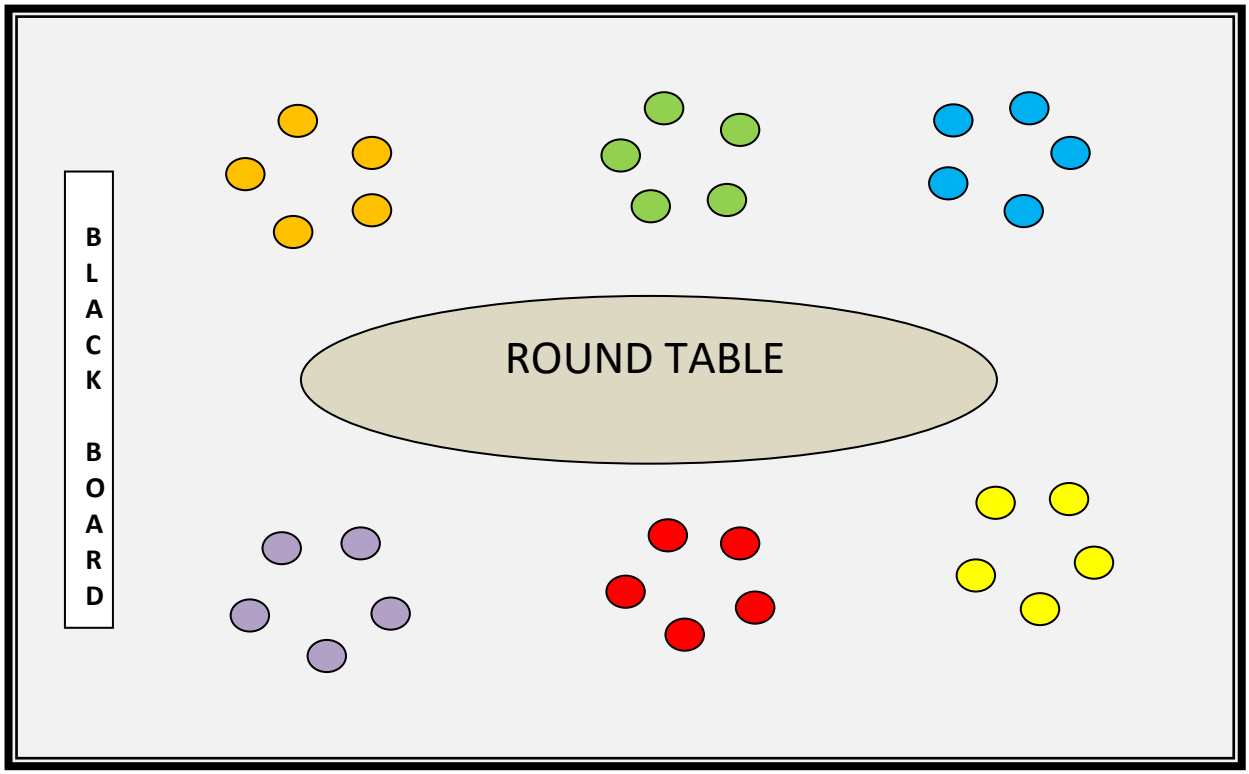
1.6 Cooperative Learning Environment:

i. Physical setup of the classroom:

The group size and seating arrangement of the students in Cooperative Learning is very important because the feasibility of interaction dependents on these two aspects mainly. If the group is too small learning opportunities will be less and if the group is too large the chances of loosing information and convenience in sharing the information will be very less by the students in their group. Most of the Cooperative Learning practitioners at school level suggest that four or five is the best group size for the students to make them in group. But students at college level or at higher education level are better mature as compared to school students and hence they can make group of size five or six also. Here in this study researcher has used five or sometimes six as a group size for Cooperative Learning based classes.

The seating arrangement of the students should be such that there should be comfortably face to face interaction. Therefore following seating arrangement structure was used by the researcher while conducting Cooperative Learning classes.

Figure 1.2: Seating Arrangement Structures of Students in Cooperative Learning Classroom



ii. Basis of group formation:

Group formation is a foundation on which the Cooperative Learning strategy built up. Group of weaker students will not produce better results as the difficulties of students cannot be solved properly. Also, group of strong students should also be avoided as they avoid wider interactions and complete their task either alone or with limited interactions. Both of these kinds of situations are not good for the class and hence a heterogeneous kind of groups should be made for conducting Cooperative Learning based classrooms. Here heterogeneous means students with mixed ability of learning. One should also take care that each student in the group must contribute in some manner like students may play different roles in their group like group coordinator, information recorder, checker, group process monitor. Their roles may be altered in each class or periodically. The role of the coordinator is to manage the group members, identify meeting places, scheduling the meeting time and communicating every information with each member of the group; the recorder maintains the information, record the entire topic related information and get ready with the final solution for the submission; the checker make a

thorough check before solution is handed in and make sure about the submission should get prior to the deadline of the time; monitor ensures that all members are understanding every step of the solution and with clear understanding about the strategy employed for getting the solution. Finally task of each student should be allotted prior and clearly.

According to Gillies (2007) following suggests the advantages of applying mix ability groups in Cooperative Learning classroom:

i. Mix ability groups promote achievement gain for low and medium ability students.
ii. A high ability student does not suffer while working with low ability students.
iii. Students acquire language skills more easily for second language when they play and work with their friends and colleagues of mixed ability groups.
iv. In Mixed ability groups social relations, Cross ethnic relations and learning are accelerated fast.
v. Student's acceptance for their friends and classmates who are suffering from learning disabilities are likely to rise.
vi. In the mixed ability groups student's Status and willingness for learning with low-status children in the class can be improved.

Mix ability groups can be made in many ways. The ways which were used by the researcher for making mixed groups are defined below:

- **Calling Numbers**: As students seated in U–shape around the Round table initially. They call numbers loudly say first student call 1, second student call 2, third student call 3, fourth student call 4, fifth student call 5, sixth student call 6, seventh student call again 1, eighth student call 2, ninth student call 3 and so on. Now first group was made of all the students called number 1, second group was made of all the students called number 2, third group was made of all the students called number 3, fourth group was made of all the students called number 4, fifth group was made of all the students called number 5 and sixth group was made of all the students called number 6. So in this way thirty students had constituted six groups. In each group five members were found and in case 31 or 32 or 33 students were present few groups with six members were also made. Since the maximum strength of the class was 33, group size never exceeds 6. It remains either 5 or at most 6.

- **Selection cum randomization:** In this way initially 6 six students of high ability were selected from the class and then for rest of the students calling number technique was used and six groups were. Now each group is attached with one student of high ability. Sometimes in this way also researcher made groups for Cooperative Learning classroom.

iii. Team Building:

In Cooperative Learning there must be cohesiveness and belongingness among the students. Each group must work as a team. Every team is like a complete system in their own. As the smooth functioning of a system depends on each and every part to get involve at its fullest similarly the success of Cooperative Learning depends upon the cohesiveness of the entire team as a group. For team building researcher has used following techniques:

- **Addressing students with name:** During interaction students address each other using their names only. The interaction may be within or between the groups. Therefore students were instructed to remember the names of their classmates. This can be done by using various strategies like playing games of hide and seek, *Pakadam Pakdai , pithu (seven stones/ satodiyu)* etc where student address each other student with their names.
- **Brief Interviews:** Here students take around two minute's time to introduce themselves to rest of the classmates. In their brief interview students are asked to mention their full name, place from where they belong, qualifications, interest, hobbies, any two strengths and any two weaknesses. This technique helps the students to understand more about their classmates.
- **I know U:** In this technique roll no. 1 speaks about the two major strengths of the roll no. 2. Then roll no. 2 speaks about the two major strengths of the roll no.3. Then roll no. 3 speaks about the two major strengths of the roll no.4 and so on. Now in this technique students started internalizing their own strengths. After completion of each turn of the student researcher addressed the students to strengthen your strengths and try to minimize your weaknesses.
- **Fish pond**: Here students were asked to drop an envelope which should mention the weaknesses of your friends. In the envelope one who is writing the message should not write his / her name but for whom it is they should write it clearly. Confidentiality was maintained about this. Researcher read all envelops and a list was prepared where weaknesses were mentioned in front of the name of the students. Each student was

informed about their weaknesses personally. And motivated too for minimizing their weaknesses. This technique helped the students to come out of their weaknesses and helps a lot in group processing and team building. This technique helps in identifying the desirable and undesirable behaviors of the students.

Psychologist Deci and Ryan (1985) suggest that human beings have three universal needs namely relatedness, competence and autonomy. Here Cooperative Learning helps to meet all the three needs of the students.

iv. Availability of Resources:

Since students were informed prior about the next topic to be covered in the class. They were provided with the list of relevant books available in the library which are related to the said topics. Students were also allowed to bring books, use of internet inside the classroom and make them use when they were solving problems in their groups. So in this way more freedom in accessing the information was made to the students while learning.

v. Generating own list of behaviors:

Students were asked to frame a list of expected behavior to be performed at the time of learning in groups. As these expected behaviors were framed by the students itself they are more likely to promote ownership of them and therefore a sense of accountability with the responsibility realized more and practiced by them.

vi. Caring and sharing nature of the teacher towards the students:

Even outside the classroom researcher interacted and shared their thoughts with the students which help the students to understand a teacher better and also helped the researcher in making a better rapport with the students. This conversation may include some personal interactions like sharing the way of spending weekends, sharing the kinds of books, novels, journals, news papers, television programs and films you are following etc so that researcher and students both can understand the common interest areas and opinion on mutual topics of interest.

vii. Fostering the Six essential elements of Cooperative Learning

The six essential elements of Cooperative Learning are Positive Interdependence, Equal Participation, Face to Face Promotive Interaction, Individual Accountability, Appropriate Use of Collaborative Skills and Group Processing. Following are the ways through which each element of Cooperative Learning was fostered inside the classroom:

a) Ways of structuring Positive interdependence:

- **Resource interdependence:** Students were made to share their resources like issued library books, internet connect, hand notes etc.
- **Suggesting platforms for doing group discussions:** Researcher gave various ideas to carryout group discussions like at CASE library, at Smt. Hansa Mehta library, on Whats App group and at conference calling through mobiles.
- **Allowing students to use mixed language (English, Guajarati and Hindi) during interactions:** Students were made free to discuss among themselves in different languages while interacting either within group or between groups.
- **Division of task into sub tasks:** Within group students decided their own to choose the sub task of the allotted task. Since all students choose their sub task with the mutual concern, sense of responsibility felt by students was more. And accountability of Learning by self was also realized by the students. Therefore they have high positive interdependency for learning.

b) **Ways of structuring Equal Participation:**

- **Using observation:** When students were performing interaction within the class researcher observed each group carefully and takes at most care that no student should left behind and no student should over rule the group. Every student must have some or the other participation in the group activity.
- **Briefing the class about expected behavior:** When students were aware of the expected behavior to be performed while learning through cooperative technique less clashes was found. Certain statements were shared by the researcher to the classmates so that they can understand the way the need to behave inside the group.
    - I also want to add….

- I do feel like this…..
- It is my opinion that…..
- I might be wrong but…
- If it is so then….
- Can we look upon this in this manner….
- Is it ok…
- Are you convinced?..…
- I am agreeing with them….
- This it difficult to solve….
- May I try….
- You can also add…..
- My argument is this….
- You may be right but I think in this way…
- This is my submission…
- You may think differently but I perceived it in this way…..etc

Such statements realized the students to give scope for others also in the interaction and make healthy participation of all the group members.

c) Ways of structuring Individual Accountability:

Actually Individual accountability of a student leads to group accountability. As individual accountability directly affects the performance of group accountability. The researcher followed the ways of structuring the individual accountability of the students:

- **Assessing the task performed by the student with in a class:** when student perform in the group researcher observed them carefully and evaluate the performance of the presenters in the group.
- **Assigning individual home assignment:** depends upon the performance in the home assignment researcher came to know the individual accountability of the students.

- **Organizing & Assessing internal exam scores of the students:** internal exam was conducted by the researcher and scores attain by the students reflected the individual accountability of the learners.

d) **Ways of structuring Face to Face Promotive Interaction:**

Face to face interaction is the preferred way of doing interaction by the students while learning through cooperative technique of learning. Following were the ways used by the researcher to structure the Face to Face Promotive Interaction:

- **Appropriate seating arrangement: S**tudents seated with face to face when doing group interaction. Here the space of the classroom was enough large to accommodate to chairs in circular shape so that each member can see the other member of their group. Even substantial distance was maintained between the groups so that they may not get disturbance while interacting.
- **Enough time and space was given to the students for doing discussion:** Researcher arranged two successive classes for the organization of Cooperative Learning class. Where ample time was given to the students for their group discussion and presenting their ideas.
- **Out sourcing help or helping other groups if they are seeking help from your group:** In case some group is unable to perform some task or need some help to move ahead then members of other group may also helped them.

e) Ways of structuring Appropriate Use of Collaborative Skills:

Since students worked in small groups chances of arising conflicts and problems were more but proper orientation was given to them which reduces the chances of conflicts among them. Some interpersonal skills are like actively listening, stating ideas freely, accepting responsibility for one's behavior, providing constructive criticism and small group skills are taking turns, sharing tasks, making decisions democratically, trying to understand the other person's perspective, clarifying differences. Following were the ways of structuring Appropriate Use of Collaborative Skills:

- **Acknowledging someone's good experience or bad experience when worked in group activities.**

- **Reflecting upon some unacceptable behavior of a student / students in the classroom.**
- **Reflecting upon some highly desirable behavior of a student / students in the classroom.**
- **Taking reflections of students on some abnormal behavior of the student / students.**

In the above mentioned reflections focus was made on the issue and not the person involved in that situation.

f) Ways of structuring group processing:

Group processing is required for maintaining effective working relationships among the group mates and the classmates too. For that students monitored themselves and the group as well. Following were the ways used by the researcher for structuring group processing:

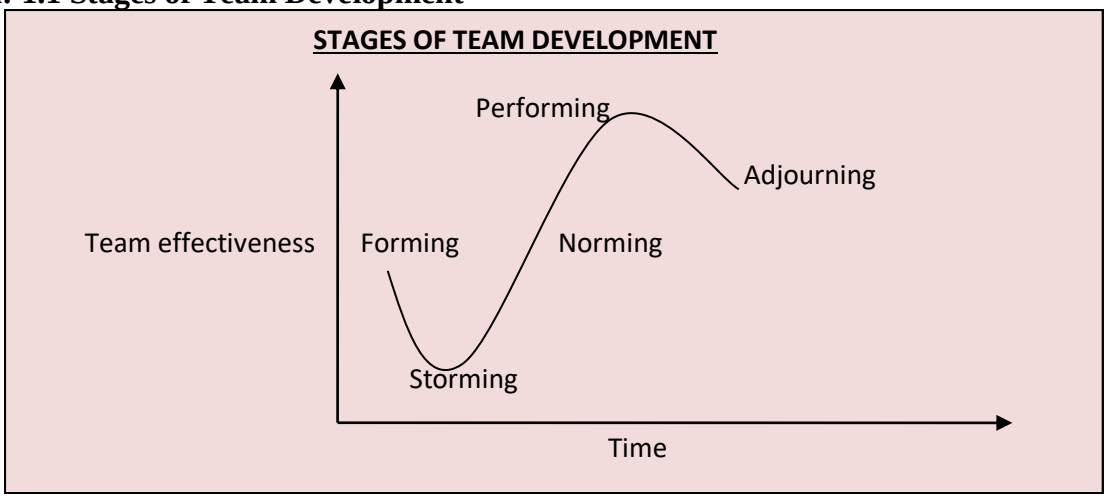
- Certain question can be asked by the students for self evaluation, like:
  - Am I Performing good?
  - Is my contribution valuable?
  - Are my group mates happy to work with me?
  - Am I able to accomplish my task?
  - How can I link my past experiences with this learning experience?
- Certain question can be asked by the students to evaluate the group performance, like:
  - What did we do in smooth conduction of group work?
  - What can be avoided to do in a group work?
  - How can we improve our group working style?
  - How can we make our better relationships with each other?
  - Can we perform this task differently?

viii. Team development of students:

When students are working in cooperative groups they pass through five stages of team development. The process of learning to work together effectively is known as team

development. Tuckman (1965) stated these five stages of team development, that is, *forming, storming, norming, performing and adjourning.*

Graph: 1.1 Stages of Team Development



- ✓ The forming stage involves experiencing some uncertainty as they begin to work out what they need to do to accomplish the common task.
- ✓ This stage is followed by the next storming stage where group members take some stress and tension as they work together with different ideas for accomplishing the common task.
- ✓ The next stage is norming which involve development of consensus about how will be the leader, who will be the coordinator, who will be the checker and so on. Allotment of responsibilities takes place i.e. norms of the team were formulated.
- ✓ The next stage is performing which involves working the actual set of required actions to attain the common goals of the group members. This is the most important stage of Cooperative Learning. Here team is focused on problem solving and meeting the common goals.
- ✓ This is the last stage i.e. adjourning which some time called as mourning also. It involves wrapping up the final tasks and documenting the efforts and results. At this stage most of the team's goals have been achieved. As members knew that group had attained his common goal so soon group will be dissolve shortly and we all proceed for the next goals. Group member may sad about this part that group is dissolving. Hence this stage is known as adjourning stage.

1.7 Assessment of Cooperative Learning

In Education the process of teaching-learning is incomplete without its assessment. Assessment ensures us about the level of achievement of the educational objectives by the learners. Here in Cooperative Learning researcher played as a pivot role "facilitator" rather than as an instructor. Hence the responsibility of "the learning" of students is equally shared by the learners and the researcher. The assessment of Cooperative Learning was carried by the researcher in the following manner. Researcher has used the following techniques in the process of assessment:

i. **Observation**: Here observation is considered as a tool for collecting information regarding the participation of students in their respective groups. Initially those who participated less were motivated to participate more by giving special opportunities to perform certain tasks.

ii. **Field Notes**: After completion of each class immediately researcher wrote certain observations which she felt and found evident in the classroom. These observations helped the researcher to improve the lesson planning for teaching through Cooperative Learning. It also gives some information about the students to understand them better.

iii. **Assessment of Home Work**: For assessing the individual performance home assignment was given to students and weekly supervised by the researcher.

iv. **Work Sheets / Task Sheets**: In groups work sheets/ task sheets were given where students need to solve the work sheets / task sheets in groups. Here there is lot of scope of interaction among the students. These work sheets were completed in classrooms only and students presented their accomplished tasks in groups.

v. **Rating Scale**: Through rating scale students rated their self performance and effectiveness of Cooperative Learning can be studied from this.

vi. **Post Achievement Test**: Scores of this test signifies the level of achievement of the educational objectives of teaching of data analysis techniques through Cooperative Learning of the students.

vii. **Internal Test / Class Test**: Scores of this test were used to give feedback to the students regarding their performances.

viii. **Group Presentations:** After the completion of task while working in cooperative groups students were asked to present their piece of work in a group presentation.

ix. **Individual Assignments**: After completion of each lesson of the syllabus individual assignment was given for assessing the individual performance of the student.

1.8 Quantitative Data Analysis Techniques and Cooperative Learning

Here in this study, quantitative data analysis techniques were comprised of both descriptive statistics and inferential statistics. In 2013 researcher has browsed the online syllabus of M. Ed. programme of various universities like Devi Ahilya University, Indore; Mumbai University; Delhi University; The Maharaja Sayjirao University of Baroda, Vadodara and Regional Institute of Education Bhopal. After reviewing the M.Ed. syllabus of all these, the researcher prepared a list of data analysis techniques which were commonly found among them. This list of data analysis techniques was finalized after discussing with of my Ph.D. supervisor and the list comprised of the following data analysis techniques:

❖ **Descriptive Statistics:**

- Graphs & charts
- Measures of Central Tendency
- Measures of Dispersion
- Kurtosis and Skewness
- Correlation (simple, partial, multiple, bi-serial, point bi-serial)
- Simple Regression and Concept of Multiple Regression
- Z-Score
- Sampling Methods (probability sampling- simple random sampling, cluster sampling, systematic sampling, stratified sampling, multi phase sampling, multi stage sampling; non-probability sampling- purposive sampling, judgmental sampling, convenient sampling, quota sampling, snow ball sampling)

❖ **Inferential statistics:**

- Steps of doing hypothesis testing
- Parametric tests: t-test (testing for mean, testing for correlation, testing for proportion), f-test (ANOVA, ANCOVA), chi-square test (testing for variance), Confidence Interval.
- Nonparametric tests: Median test, Sign test, Mann Whitney U-test, Chi-square test (Testing for Independence of Two Attributes, Testing Whether Observations Are Normally distributed or not, Testing whether observations are equally distribution or not).

Hence for this study the researcher considered all the above mentioned data analysis techniques in her study. A large number of workshops, seminars, conferences and symposiums are being organized at national as well as on international levels. Now a day every university is organizing at least one workshop on Research Methodology either on quantitative data analysis techniques or on qualitative data analysis techniques. UGC has also realized its importance for researchers

and so suggested to do compulsory Course Work by the research scholars at primary stage of their research work. Since there is a mutual relationship between quality of Education and the data analysis techniques as Innovations and refinements in educational practices (in education) are brought through educational researches where as better education (i.e. better knowledge, understanding and application of Statistical data analysis techniques in research) brings quality in educational researches. To make teaching–learning process more effective and innovative one should use some new techniques of teaching pedagogy. According to NEP (2019) draft, "the major obstacles for conducting research in India at present time includes lack of funding for research; lack of a research culture and mindset; and lack of research capability in most universities. For removal of impediments to research and for significant expansion of research and innovations in our country, a new National Research Foundation (NRF) will be set up through an Act of Parliament, as an autonomous body of the Government of India, to fund, mentor, incentivize, and build capacity for quality research across the country in all disciplines, primarily at universities and colleges, both public and private". It is also mentioned in that "Departments of Education in universities, in addition to teaching, will need to be strengthened and developed as spaces for research and innovation in education", which signifies that research is an at most area of concern for higher education institutions. Therefore learning data analysis techniques for improving research competencies through effective pedagogy is a need of an hour. Now a day there is a great focus on group work as group has a social capital that can be used in teaching learning process in a right manner. The reviews of the related literatures shows that many researches has been made at abroad but very few has been found in India on Cooperative learning. More over most of the studies were conducted on school education and with learning of either second language or in the discipline of Science and Mathematics.

Researcher has conducted a pilot study on "Competency in using data analysis techniques in research work". It was administered on 36 Ph.D. research scholars who has either submitted their thesis or has completed their data analysis of their doctoral study. It was found that 66.66% of Ph.D. students took help from professional data analysts and paid a good amount to them; 22.22% of Ph.D. students said they have performed data analysis of their doctoral study by their own and 11.11% of Ph.D. students said that their data analysis was done with the help of their guide only. All these results persuaded the researcher to take this piece of work as a doctoral study.

1.9 Review of Related Literature:

Review of the related literature is an eternal part of any research process. Without reviewing each research is incomplete and chances of duplication of work enhances. Through a proper review of research researcher can trace substantive research gaps in the researches and worked upon them. Following are the relevant studies reviewed by the investigator:

1.9.1 Recent Reviews related to Education on Higher Education in India:

Chaudhary (2019) studied on "Outcome Based Education in Higher Education Institutions in India Assessment of Understanding and Application and Measuring Training Impact"; Trakru (2017) studied on "Effectiveness of e Learning in Higher Education An Empirical Study"; Khan (2015) studied on "Higher Education In Punjab An Evaluative Study"; Kholi (2011) studied on "A study of environmental education attitude and awareness among the students in higher education in Nagaland"; Singai (2018) studied on "Higher Education And University Governance In India"; Sarmah (2015) studied on "Inequality in access to higher education"; Bhatnagar (2015) studied on "A study of higher technical educational institutes in western UP and NCR with special reference to qualification and performance of faculty in delivering quality education"; Hijam (2015) studied on "Management of the higher education in Manipur since 1972"; Singh (2015) studied on "The growth of higher education in Manipur 1980 - 2001"; Pradhan (2015) studied on "A Study of the Materials and Methodology Used to Teach English in Colleges of Engineering"; Tajeri (2017) studied on "An exploration of digital storytelling as a learning activity in teaching of English as a second language in higher education"; Ahjuja (2018) studied on "An in depth studies of teaching competencies of higher education teachers and its relation to social capital"; Banumathi (2018) studied on "Faculty competencies for effective teaching learning process in higher education institutions"; Nagaraj (2005) studied on "Effectiveness of reciprocal teaching technique in enhancing the reading skills of engineering students in English"; Chandrasekarac (2012) studied on "Effective communicative English teaching techniques for non English speakers at the undergraduate programmee." From these recent studies on higher education researcher could found that the major area of investigation of researchers in higher education are on studying the training impact, studying the ICT or e-learning impact, studying the awareness, attitude, performance and teaching competencies of the teachers and students in higher education. Investigators have also studied the status of higher education in different states.

1.9.2 Reviews related to Teacher Education Programmes in India:

Mishra (2018) studied on "A study of relationship of academic achievement to aptitude, attitude and anxiety of MEd students studying under Dr. Babasaheb Ambedkar Marathwada university jurisdiction"; Yazdani (2016) studied on "Professionalism among Teacher Educators of District Institute of Education and Training DIETs in Delhi"; Gunjal (2014) studied on "Evaluative study of the relation between socio economic background with perception and attitude of B Ed students towards teacher training and teaching profession"; Atula (2016) studied on "Teacher Education Programmes in Himachal Pradesh An evaluation Study"; Balasubramanya (2017) studied on "Teaching competence of teacher educators in relation to their personality type and attitude towards teaching profession"; Mathew (2003) studied on "Feasibility of implementing Modern Instructional strategies in the Institutions of Teacher Education in Kerala"; Nagarathna (2018) studied on "A study of the intended and implemented curriculum of internship at secondary teacher education in Karnataka"; Singh (1990) studied on "Effectiveness of VALUE Teaching Using Value Clarifying Strategies in Development Value Orienation of Student Teachers"; Moruskar (2004) studied on "A comparative study of the teachers trained through four year integrated course and one year course in secondary teacher education in respect of teacher competency and teaching effectiveness"; Gopinath (2014) studied on "Developing a package based on metacognitive strategies for promoting skills in teaching Mathematics among student teachers at secondary level"; Qureshi (2016) studied on "Teaching Aptitude Level of Intelligence Mental Health and Attitude towards Teaching of Student Teachers in Secondary Teacher Education Institutions of Jammu and Kashmir Divisions A Comparative Study"; Santhakumari (2014) studied on "Study on the perception of teacher educators on the practical aspects of secondary teacher education"; Subbulakshmi (2016) studied on "An Analysis of The Techniques of Teaching Drama to ESL Learners"; Khan (2007) studied on "To investigate into the effectiveness of microteaching as a techniques on general teaching competence (GTC) on pupil teachers". Sansanwal (1976) studied the effect of Programmed learning material for teaching of research methodology at M.Ed. level. He has used a control group experimental for the study and found that the program is effective for learning research methodology.

From the above mentioned recent studies in teacher education researcher found that most of the investigators studied on perception, attitude, aptitude and teaching competencies of teacher educators towards teaching profession, effectiveness of some programme like new internship

programme, microteaching, developed package, value teaching etc. Here studies are comparative, evaluative, survey and experimental in nature. In the premises of Teacher Education most of the researches are either on B.Ed. students or on Teacher educators and very few studies were conducted on M.Ed. students. Only one study of Sansanwal (1976) was found on M.Ed. students for learning of Research Methodology with Programmed learning material strategy. Still no such study was found who took interest in teaching of Data analysis techniques to M.Ed. students with some effective strategy.

1.9.3 Reviews related to Cooperative Learning

- **Old reviews related to Cooperative Learning**

Salvin (1953) studied Cooperative Learning methods mostly aim at the development of cognition, which includes thinking, remembering, concept formation, problem solving and logical reasoning in social context.

Vygotsky (1978) defined and pointed out the existence of a zone of proximal development, which means a distance between what a student could do alone (the actual development level) and what a student could achieve in collaboration with others (the proximal level). They called good learning if there is advance development to the next zone. The main path of learning proceeds from the social to the individual. Therefore, the proximal level today in collaboration with other will be the actual development level tomorrow.

Krashen (1985) identified second or foreign language acquisition should be a highly collaborative and interactive process. He also claimed that a small group approach enabled learners to gain better language competencies than teaching methodologies that stressed the memorization of grammar, vocabulary and drill exercises in isolation.

Newmann & Thompson (1987) has provided descriptive inventory of research studies of Cooperative Learning at the secondary level. They have reviewed twenty-seven reports of high quality studies, involving 37 comparisons of cooperative versus control methods. The effectiveness of Cooperative Learning is discussed along with implications for practice. Cooperative Learning is also advocated for improving social relations between races, ethnic groups, high and low achievers, or for increasing productivity in problem solving. A summary is presented on studies of five major techniques for implementing Cooperative Learning in grades 7-12.

Johnson et al. (1987) conducted a Meta analysis of 122 studies of Cooperative Learning done between the years 1924 to 1981. This analysis concluded that the results holds true for all age of students, for all subjects and for various nature of tasks that Cooperative Learning leads to promote higher achievement as compared to competitive or individual learning.

Slavin (1991) traced and evaluated 70 studies on Cooperative Learning methods which were conducted for at least 4 weeks or even longer duration. Here also it was found that Cooperative learning is significantly effective in all grade levels, in all major subjects, in all kind of residential say rural, urban and suburban schools. It was also being found that for average, poor and high achievers the effects of Cooperative Learning were equally positive.

Muthaiah (1994) studied on "A study of the effectiveness of Cooperative Learning strategy in enhancing achievement in mathematics and social interaction of high school students in Coimbatore".

Murray (1994) identified learning is social and further stresses that people learn best when they learn through social interaction.

Banerjee (1997) compared the effect of lecture and Cooperative Learning strategies on achievement in chemistry in undergraduate students. Peer assisted learning has significant positive effects on study achievements. The results are consistent with the arguments put forward by Gyanani & Pahuja (1995) (as sited in Prof. Dr. Mohamed Dahlan Bin Ibrahim and Dr. Naila Aaijaz, 2011).

Rahaya (1998) conducted a study using STAD/Jigsaw as a model which involved 1180 students from 18 schools. It was also found that Cooperative Learning can enhance scientific skills, promote enquiry learning and increase science achievement.

Armstrong (1999) conducted a study comparing the performance of homogenously grouped, gifted students to heterogeneous ability groups that included gifted, average and low performing learners. Both groups experienced a comparable increase in achievement after working together, with gifted group performing only slightly higher (as sited in Qaisara Parveen, Sheikh Tariq Mahmood, Dr. Azhar Mahmood, & Prof. Manzoor Arif, 2011).

Kosar (2003) investigated the effects of Cooperative Learning on the achievement of 7th class students in the subject of Social Studies. The sample comprised 40 students of 7th class equally placed in experimental group and control group on the basis of scores obtained in the social

studies annual examination. In this experiment of two weeks, "Cooperative Learning resulted in higher achievement as compared to routine method of teaching social studies" (as sited in Qaisara Parveen, Sheikh Tariq Mahmood, Dr. Azhar Mahmood, & Prof. Manzoor Arif, 2011).

Siddiqui (2003) studied the available researches on second language acquisition which reveals that to develop and learn a language, learners must interact in that language. Increasing the frequency and variety of the verbal interaction in which learners participate is an important goal of any instruction based on the principles of second language acquisition. The teacher-fronted approach often ends up preventing students from having genuine interactions with the teacher and fellow students because the teacher initiates and controls the interaction. Collaborative learning encourages mutual interaction and, by increasing the number of opportunities available for verbal expression, provides opportunities for a wider range of communicative functions than those found in teacher fronted classrooms (as sited in Qaisara Parveen, Sheikh Tariq Mahmood, Dr. Azhar Mahmood, & Prof. Manzoor Arif, 2011).

Jhala (2003) studied on "A study of the effectiveness of Cooperative Learning and mastery learning approaches in teaching of algebra in STD IX".

Chien (2004) conducted study on incorporating Cooperative Learning to teach English as a foreign language in Taiwan. The purpose of the study was to provide a measure of the effectiveness of Cooperative Learning in teaching English as a foreign language in terms of students' achievement, oral production and improvement in students' attitude language learning. Results shows that teaching through Cooperative Learning proved to be effective as all the classes improved over the scores gained in pre-test and post test.

Iqbal (2004) studied that Cooperative Learning is more effective as a teaching learning technique for mathematics as compared to traditional teaching method. Students in cooperative groups outscored the students working in traditional learning situation, but in cooperative groups, they have no obvious supremacy over students taught by traditional method in retaining the learnt mathematical material. Low achievers in cooperative groups have significant superiority over high achiever (as sited in Qaisara Parveen, Sheikh Tariq Mahmood, Dr. Azhar Mahmood, & Prof. Manzoor Arif, 2011).

- **Recent reviews related to Cooperative Learning**

Lin & Li Li (2010) studied to examine the perspectives of both teachers and students toward the Cooperative Learning Jigsaw technique as an instructional approach within university level

English learning in Taiwan. A qualitative descriptive approach was utilized to discover and interpret the elements of both Taiwanese teachers and students' perspectives toward Cooperative Learning Jigsaw as an instructional approach in English classrooms. The results of this study showed that the Cooperative Learning Jigsaw technique significantly contributed to the English learning of the university level freshmen students at Southern Taiwan University in Taiwan. The findings generated from the interviews, classroom observations, and survey questionnaires indicated that Taiwanese instructors and students had both positive and negative opinions about the Cooperative Learning Jigsaw technique. However, both teachers and students expressed their willingness to continue adopting this teaching approach to either teach or learn English in their future English classes. Additionally, teachers' difficulties about implementing the Cooperative Learning Jigsaw technique were analyzed in this study. Ultimately, both Taiwanese instructors and students highlighted the important factors that made the Cooperative Learning Jigsaw technique successful in their English classroom learning. The findings of this study have some pedagogical implications that inform suggestions for future English teaching in Taiwan's university institutions.

Arco-Tirado et. al., (2011) studied the impact of a peer tutoring program on preventing academic failure and dropouts among first-year students (N = 100), from Civil Engineering, Economics, Pharmacy, and Chemical Engineering careers; while, on the other hand, to identify the potential benefits of such tutoring program on the cognitive and meta cognitive learning strategies and social skills of student mentors in their last year of studies or already in a postgraduate program (N = 41) at the University of Granada (Spain). The results show differences in favour of the treatment group on grade point average, performance rate, success rate and learning strategies and, also, statistically significant pre-post differences for the tutors on learning strategies and social skills.

Sahin & Abdullah (2011) compared the Jigsaw III technique (of Cooperative Learning) with the instructional teacher-centered teaching method in six graders in terms of the effect of written expression on their academic success. The sample of the study consists of 71 sixth-grade students studying during 2009-2010 academic term in a primary school in the province of Erzurum. Two classes were randomly selected: one (n = 35) of which was the control group where teacher-centered teaching method was applied, the other being experimental group (n = 36) where the Jigsaw III technique was applied. In the study, one of the most common

application, pretest/posttest with control group experimental design, was chosen. The data regarding the academic success of the groups were collected by means of the achievement test in Turkish course as pretest, posttest and retention test; the students' opinions about the group works were obtained through feedback form, group work opinionnaire, and data were analyzed through 11.5 SPSS program. The results of the statistical analysis of teaching a written expression course showed that the experimental group did significantly better than the control group in terms of academic success. In addition, it can be said that the students had positive impressions on the Jigsaw III technique.

Maden & Sedat, (2011) studied to compare the effects of Jigsaw I technique from traditional teaching method on academic achievement and retrieval of Turkish teacher candidates in the matter of written expression. The sample of the study consists of 70 students studying at the Department of Turkish teaching in the academic year of 2009 - 2010. One of the classes was randomly specified as control group (N=34) to which traditional teaching method was applied while the other as test group to which the Jigsaw technique (N=36) was applied. It was observed as a result of statistical analyses that there was not a significant variation in favor of the test group in terms of academic success and stability between the test group and the control group in teaching the written expression subject. It was also determined according to the results obtained from the study that the students stated positive views for the Jigsaw I technique.

Wang et. al. (2011) studied the impact of animation interactivity on novices' learning of introductory statistics. The interactive animation program used in this study was created with Adobe Flash following Mayer's multimedia design principles as well as Kristof and Satran's interactivity theory. This study was guided by three main questions: 1) Is there any difference in achievement improvement among students who use different interactive levels of an animation program? 2) Is there any difference in confidence improvement among students who use different interactive levels of an animation program? 3) Is there any difference in program perception among students who use different interactive levels of an animation program? A sample of 123 college students participated in the study and was randomly assigned into four groups. The students used the animation program in the computer lab and then took online surveys and tests for evaluation. The findings were as follows: 1) Animation interactivity impacted students' improvement on understanding ($p = 0.006$) and lower-level applying ($p = 0.042$), and 2) animation interactivity did not significantly impact student confidence

and program perception. Students' lack of cognitive skills and the time limit might decrease the effect of the interactive animation.

Thomas (2013) studied on "A study on the effectiveness of a strategy based on Cooperative Learning for science teaching in class VII". Awasthi (2014) studied on "Impact of Cooperative Learning on achievement, self esteem and cohesiveness of students of different personality types". Sivakumar (2014) studied on "Effectiveness of Cooperative Learning and Computer Assisted Learning on the Academic Achievement of IX Standard Students in Biology". Jeevan (2017) studied on "Effect of Cooperative Learning on academic anxiety social skills and achievement in social studies of secondary school students". Jose (2018) studied on "Developing a model based on Cooperative Learning for enhancing social intelligence and academic achievement among students at upper primary level". Khint (2018) studied on "A study of an effectiveness of CLL cooperative language learning and MI multiple intelligence on educational achievement and retention with reference to teaching of Gujarati language".

All these studies suggest that Cooperative Learning strategy is mostly implemented on upper primary, secondary and higher secondary students with mathematics, science, biology and language subjects. Researcher has also observed that in most of the studies academic achievement, social skills, social intelligence, cohesiveness of students is also studied by the investigators. Here nature of studies are either experimental, descriptive survey, evaluative or comparative.

1.10 Implications for the Present Study:

The review of the related literature mentioned has the following implications for this study:

- The review of all the above mentioned studies reveals that Cooperative Learning is a very powerful strategy in the classroom. Reviews suggested that a large number of studies were done on Cooperative Learning in different subjects namely, Muthaiah (1994) Banerjee (1997), Siti Rahaya (1998), Armstrong (1999), Kosar (2003), Iqbal (2004), Arco-Tirado et.al (2011), Sahin & Abdullah (2011), Maden & Sedat (2011), Thomas (2013), Sivakumar (2014) and Jeevan (2017).
- Some studies were found on learning of their first language through Cooperative Learning namely by Khint (2018) and few were of foreign language learning through

Cooperative Learning namely Krashen's (1985) and second language acquisition by Siddique (2003), Chien (2004), Lin & Li Li (2010).

- Cooperative Learning not only enhances academic achievements but also enhances certain psychological constructs like scientific skills and enquiry learning Rahaya (1998); self esteem and cohesiveness Awasthi (2014); social intelligence Jose (2018); multiple intelligence Khint (2018) and social skills Jeevan (2017).
- Cooperative Learning also helps in attaining mastery learning in Mathematics Jhala (2003).
- It is also found from the studies of Salvin (1953) and Vygotsky (1978) that cognitive development, problem solving and logical reasoning enhances from Cooperative Learning. One recent study done by Wang et.al (2011) shown positive results in learning of statistics through interactive animation. Three Meta analyses were done by Johnson et.al (1987), Newmann & Thompson (1987) and Salvin (1991) which reflects that Cooperative Learning is highly effective in learning.
- Slavin (1991) identified 70 studies and found that Cooperative Learning is effective at all grade levels in the same degree, in all major subjects and in urban, rural and suburban schools. Effects were equally positive for high, average and low achievers.
- On Cooperative Learning most of the studies were conducted on upper primary, secondary and higher secondary students and very few has been implemented on college level or at the higher education level.
- Investigator has come across Banerjee (1997) study which was conducted at undergraduate level and Lin & Li Li (2010) study which was conducted at university level. In both the study's results hold the same for Cooperative Learning.
- Investigator has come across only single study conducted by Sansanwal (1976) which is relating with learning of research methodology through PLM.
- It is being observed that most of the studies are of experimental in nature and very few of them are of evaluative, comparative or of survey type.
- In most of the studies mentioned above impact of Cooperative Learning is affecting the academic achievement, social skills, social intelligence and perception of the students.
- In spite of all these research findings we can see that in our country there is a dearth of such studies related to Cooperative Learning in higher education and specifically in

learning of data analysis techniques. Therefore, Investigator wants to study the effect on learning of data analysis techniques through Cooperative Learning strategy on M.Ed. students.

1.11 Research Questions:

i. How can we enhance research competence of M.Ed. students?
ii. How can we reduce fear of M.Ed. students for learning data analysis techniques?

1.12 Rationale of the Present Study:

Education needs innovation and novelties in educational practices so that we can be at par with the modern world. Since innovations and novelties in education are brought up through educational researches and quality of these researches depends upon the quality of education received by the educational researchers. Therefore, the investigator has picked up this area for the study purpose i.e. a study on learning of data analysis techniques. In the NEP (2019) draft, it is repeatedly mentioned that research is in a nascent stage particularly at State Universities where about 93% of all students in higher education are enrolled. Moreover it is being observed that in Higher Education teaching institutions (TI) and research institutions (RI) work separately as most of the teaching institutions i.e. colleges and universities carry very less number of researches in our country. These less number of researches is caused because of two reasons, first is fewer interest and poor knowledge of research processes or research methodology and second is absence of research environment which leads to low researches and fewer innovations in the field. Academically sound research environment can be developed when research pedagogy will be improved. Therefore first innovations in teaching-learning process of research need to be address in higher education.

This is the reason why researcher chooses this as area of research i.e. studying the effects of Cooperative Learning on student's learning of Data analysis techniques. For dealing with futuristic problems it is directed by NEP (2019) draft that for quality Higher Education there will be three kinds of institutions in our country namely, Research Universities, Teaching Universities and Colleges. Research Universities will provide teaching and research simultaneously. Research Universities will dedicate themselves to cutting-edge research for new

knowledge creation while at the same time offering the highest quality teaching across various degrees and diploma programmes.

From last few decades 'students' become the main focus in teaching –learning process and therefore now a days we are focusing on "student centered learning approaches". In student centered learning approach, student plays a pivot role instead of a teacher but the role of a teacher is more crucial as a facilitator, guide and as a director.

According to NEP (2019) draft " Instead of solely mechanistic rote learning, colleges and universities must encourage active learners to develop the abilities of independent, logical, and scientific thinking, creativity and problem solving and decision making". It is also advocated by NEP (2019) draft that "Teaching would require going beyond the standard lecture method to use pedagogical approaches that involve student participation and dialogue, relevant field work and hands-on activities and facilitating student ownership of learning experiences. Seminars, symposia, independent reading scaffolded by the teacher and group and individual projects are some examples of pedagogical strategies that can be adopted. Cooperative and peer-supported activities can help substantially in empowering students to take charge of their own learning". This also suggest that in teaching-learning process such pedagogy should be used which can enhance various skills and competencies among the learners, hence researcher choose to select Cooperative Learning as a pedagogy while teaching data analysis techniques to the students. Johnson & Johnson (1985) suggested that Cooperative Learning has been advocated as an instructional strategy because of its positive effect on achievement and on other attributes that accompany the acquisition of knowledge, including motivation, classroom socialization, student's confidence in learning and attitude toward the subject being learned (as sited in G. Giraud, 1997). Similar results from all the studies reviewed by the investigator has been found and it is clear to see that Cooperative Learning is a highly effective strategy in classroom, whether the students are of upper primary, secondary, higher secondary level or of college level. In the similar lines Bligh (1972) reviewed close to 100 studies conducted at the college level over 50 years of period. He found that students who become involved in active discussion of their ideas with other students are more likely to have less irrelevant or distracting thoughts and spend more time in synthesizing and integrating concepts than students who listen to lectures. "All these comparisons are statistically significant and suggest during discussion students are

more attentive, active and thoughtful than in lectures" (as sited in James Cooper, Susan Prescott, Lenora Cook, Lyle Smith, Randall Mueck and Joseph Cuseo, 1990).

According to NEP (2019) draft, "It should be emphasized that higher education must build expertise that society will need over the next 25 years and beyond. Simply tailoring people into jobs that exist today, but that are likely to change or disappear after some years, is suboptimal and even counterproductive. The future workplace will demand critical thinking, communication, problem solving, creativity, and multidisciplinary capability. Single-skill and single-discipline jobs are likely to become automated over time. Therefore, there will be a great need to focus on multidisciplinary and 21st century capabilities necessary for the employment landscape of the future - such as critical thinking, communication, problem solving, creativity, cultural literacy, global outlook, teamwork, ethical reasoning, and social responsibility - will not only help to develop outstanding employees but also outstanding citizens and communities". It is clear from the above said statements that now simple lecture method for teaching cannot serve the purpose of teaching but some innovative teaching methods are required for developing certain 21st century required skills like critical thinking, communication, problem solving, creativity, leadership, conflict manager, task oriented, social skills etc. therefore researcher choose Cooperative Learning strategy as a teaching strategy.

As educational researchers learn data analysis techniques in depth at M.Ed. degree course where students heterogeneity can be seen in various forms like their parent disciplines from which they are graduated or post graduated in Science, Humanities and Commerce; of various age groups, of various medium of instructions they opted like Hindi, English, Gujarati etc. Therefore it is necessary to cater their needs in terms of knowledge, understanding proper utilization and application of Statistical data analysis techniques so that, they can efficiently do their dissertations work for M.Ed. degree and further research work. By considering all these factors the investigator has decided to conduct a study on M.Ed. students for learning of Statistical data analysis techniques through Cooperative Learning.

1.13 Statement of the Problem:

Development of an Educational Program on Data Analysis Techniques for M.Ed. Students through Cooperative Learning

1.14 Objectives of the Study:

i. To design lessons on various data analysis techniques for M.Ed. Students.

ii. To study the effectiveness of the Educational Program on data analysis techniques for M.Ed. Students through Cooperative Learning in terms of achievement scores of the students.

iii. To study the reactions of M.Ed. Students towards the Educational Program on data analysis techniques through Cooperative Learning for M.Ed. students.

1.15 Hypotheses of the Study:

i. Ho1: There will be no significant difference between mean scores of achievement of the students who studied data analysis techniques through Cooperative Learning and that with conventional method.

ii. Ho2: There will be no significant difference between the observed frequencies against reactions of M.Ed. students who had learnt data analysis techniques from Cooperative Learning and the frequencies expected against the equal probability.

iii. Ho3: There will be no relationship between the achievement scores of M.Ed. students who had learnt data analysis techniques from Cooperative Learning and their respective cooperative scores.

1.16 Operationalization of the Terms:

i. **Effectiveness:** The scores which are obtained from an achievement test after the implementation of learning program of data analysis techniques through Cooperative Learning on M.Ed. students.

ii. **Reactions:** A reaction scale was constructed by the investigator and reactions of the M.Ed. students were recorded to know the impact of the educational program of data analysis techniques through Cooperative Learning.

iii. **Cooperative Score:** This is a score calculated for each student on the basis of their reactions on the reaction scale.

1.17 Delimitations of the study:

i. The medium of instruction for the study was English language.

ii. The Educational Programme includes selected Statistical data analysis techniques only.