Summary and Implications of the Study

1.1 Introduction:

The recent challenge of Indian education is quality education rather just access to education and quality in education can be brought through good researches in education field. In NEP (2019) draft, the status of research in our country India is 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 (Research and Innovation) investment of nations and various measures of their prosperity such as GDP per capita. 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. 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 had already been carried out in the field of education but still there is plenty of scope to bring improvement in Education field also. One of the means to bring quality in education is through the quality in educational researches. In this present study the investigator has dealt with only quantitative data analysis techniques of research. In education field the formal learning experiences in educational research can be obtained from M.Ed. degree programme where an appropriate knowledge, understanding and application of data analysis techniques need to be learnt properly. Moreover it is the responsibility of teachers to provide such learning environment where dialogue and discussion could be made possible and students learning can be enhanced and stimulate. 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 basic foundation of Cooperative learning lies in the fact that learning is most effective when students are actively involved in sharing their thoughts, ideas and work cooperatively to accomplish their allotted academic tasks.

1.2 Cooperative Learning:

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:

The first element is **Positive Interdependence**. Positive independence means that a gain for one student is associated with gains for the other students. The second element is **Equal Participation**. Equal participation refers to the fact that no student should be allowed to dominate a group, either socially or academically. The third element is **Individual Accountability**. Individual accountability means that when a group member accept as a personal responsibility of their contributions for the attainment of their common goal. The fourth element is **Face to Face Promotive Interaction**. In cooperative groups, group members meet face to face to work together to complete assignments and promote each other's success. The fifth element is **Appropriate Use of Collaborative Skills**. Cooperative learning is inherently more complex than competitive or individualistic learning because students have to engage in task work and teamwork simultaneously to coordinate efforts that will achieve mutual goals. Here students are encouraged and helped to develop and practice trust-building, leadership, decision-making, communication, and conflict management skills. The sixth element is **Group Processing**. Under Group processing basically two important actions are considered; first is to describe what member actions were desirable/helpful and undesirable/unhelpful in the process of completing the common task and second is to make decisions about what actions to be remain as continue or change.

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:

- Learners participate actively;
- Teachers become learners at times, and learners sometimes teach;
- Mutual respect is developed towards every member;
- Projects and questions develop interest and challenge to students;
- Diversity is celebrated and all contributions are valued;
- Students learn skills for resolving conflicts when they arise;

- Members draw upon their past experience and knowledge;
- Goals are clearly identified and used as a guide;
- Students are invested in their own learning.

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

Table 1: Comparison of traditional classroom and 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 notebooks.	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 attention of teachers and friends.	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 as sources & resources.

According to Yale and Gillies (2011) well structured Cooperative Learning procedure enables students of diverse backgrounds and cultural heritages to contribute to every one'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".

1.3 Cooperative Learning Types:

According to Johnson & Johnson (1998), there are three ways that cooperative learning may be used.

- **Formal cooperative learning group** may run for one class to few classes or 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.
- **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.
- **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.

1.4 Cooperative Learning Techniques:

There are many techniques by which cooperative learning strategies can be employed in classrooms. Following are some of the common techniques which are used in different classrooms as cooperative learning techniques:

- Student Teams-Achievement Divisions (STAD)
- Cooperative Integrated Reading and Composition (CIRC)
- Jigsaw
- Learning Together
- Group Investigation
- Cooperative Scripting

1.5. 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 aroused 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.

Table 2: Theoretical Perspectives of Cooperative Learning

Sl. No.	Theoretical Perspectives	Contributors
1	Cognitive-Developmental Theory	• 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. • Lev Vygotsky: cognitive development is a result of social interaction
2	Behavioral Learning Theory	• 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).
3	Social Interdependence Theory	• Kurt Koffka (1910): that the whole is greater than the sum of its parts and where groups are dynamic wholes member interdependence. • Kurt Lewin (1935): behavior is the result of the individual and the environment. • Morton Deutsch (1949, 1962): 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. • Johnson, D. and Johnson, R. (2009): Cooperative Learning majorly focused on three areas of students (i) efforts to achieve (ii) pro-social behavior and social support and (iii) psychological health and self esteem • Celeste M. Brody (2011): 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. • Peterson and Miller (2004): 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): Cooperative Learning experiences are crucial in 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.

1.6 Role of Teacher in Cooperative Classroom:

In cooperative learning the role of a teacher is as a facilitator, guide and director. In the organization of cooperative classroom following aspects were taken care:

i. **Physical setup of the classroom:** Students can work in team and face to face interaction become possible.

ii. **Basis of group formation:** Various methods were used like Calling Roll Number of students and Selection cum randomization for making heterogeneous groups.

iii. **Team Building:** Success of students rests in team building. So some techniques were used to enhance cohesiveness among the students like Addressing students with name, Brief Interviews, I know U and Fish pond.

iv. **Availability of Resources:** For acquiring information sufficient resources was ensured by the researcher for the students.

v. **Generating own list of behaviors:** students had created a list of expected behaviors to be performed at the time of learning in group. This helped in promoting self autonomy, ownership and responsibility among the students.

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

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. **Ways of Structuring Cooperative Learning Components wise are given below:**

Table 3: Ways of Structuring Cooperative Learning Components

Cooperative Learning Components	Ways of Structuring Cooperative Learning Components
Positive Interdependence	Resource interdependence, Suggesting platforms for doing group discussions, Allowing students to use mixed language (English, Guajarati and Hindi) during interactions, Division of task into sub tasks.
Equal Participation	Using observation, Briefing the class about expected behavior.
Individual Accountability	Assessing the task performed by the student with in a class, Assigning individual home assignment, Organizing & Assessing internal exam scores of the students.
Face to Face Promotive Interaction	Appropriate seating arrangement, Enough time and space was given to the students for doing discussion, Out sourcing help or helping other groups if they are seeking help from your group.
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.
Group Processing	• Certain question can be asked by the students for self evaluation, like: Am I Performing good?

	Is my contribution valuable? • 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?

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. The five stages of team development are i.e.- *forming, storming, norming, performing and adjourning.*

1.7 Assessment of Cooperative Learning:

Researcher has used Observation, Field Notes, Assessment of Home Work, Work Sheets / Task Sheets, Rating Scale, Post Achievement Test, Internal Test / Class Test, Group Presentations, and Individual Assignments for assessment of students.

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. The list of data analysis techniques which was finalized is given below:

❖ **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).

Across the nation every year a large number of Workshops are being organized on Research Methodology by various research institutions and educational institutions to enhance the capabilities of the researchers. 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. in terms of 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. Moreover most of the studies were conducted on school education and with learning of either second language or in the discipline of Science and Mathematics but not at higher education.

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:

Researcher has reviewed literatures related to recent researches in education field on Higher Education in India, teacher education programmes in India, old and recent reviews related to cooperative learning and teaching of research methodology.

It is being observed that in Education discipline very few researches were emerging on pedagogy at Higher Education in India. This statement is supported by Chaudhary (2019), Trakru (2017), Khan (2015), Singai (2018), Sarmah (2015), Bhatnagar (2015), Hijam (2015), Singh (2015), Pradhan (2015), Tajeri (2017), Ahjuja (2018), Banumathi (2018), Nagaraj (2005), Chandrasekarac (2012). 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.

Accoeding to recent researches Mishra (2018), Nagarathna (2018), Singh (1990), Moruskar (2004), Gopinath (2014), Qureshi (2016), Santhakumari (2014), Subbulakshmi (2016), Khan (2007) suggested that on Teacher Education Programmes most of studies are 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.

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. 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.

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), Murray (1994), Banerjee (1997), Gyanani & Pahuja (1995), Rahaya (1998), Armstrong (1999), Kosar (2003), Siddiqui (2003), Jhala (2003), Chien (2004), Iqbal (2004), Lin & Li Li (2010), Sahin & Abdullah (2011), Maden & Sedat, (2011), Wang et. al. (2011), Thomas (2013), Awasthi (2014), Sivakumar (2014), Jeevan (2017), Jose (2018), Khint (2018) all the investigators found that cooperative learning 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 and 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 for 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 student's 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 Present Study:

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.

1.18 Experimental Design of the Study:

For the present study the investigator has used Pre-Test Post-Test Experimental Control Group design. There were two groups namely Experimental Group and Control Group. The investigator has managed to take the experimental group students to learn with the data analysis techniques through cooperative strategy and no particular strategy was used for control group students while learning data analysis techniques. Here in this study following variables was incorporated:

Independent variable: Cooperative learning strategy

Dependent variables: Scores on Achievement test

and

Reactions of M.Ed. students (in terms of six elements of cooperative learning)

O1 X O2	O1, O3 Pre – Test	X: Intervention on Experimental group
O3 C O4	O2, O4 Post – Test	C: No intervention on Control group

1.19 Population and Sample:

The population for the study consisted of all the students perusing M.Ed. degree course during 2015-2016 in India. There were approximately 229 colleges in India where M.Ed. course was running. Out of these two colleges were selected purposely for this study. Since 2015, M.Ed. program was of two years instead of one year. Many M.Ed. colleges faced difficulties in getting sufficient enrolment. Hence two institutions, namely, Department of Education (CASE), Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara and Regional institute of Education, Bhopal agreed for this study where reasonable numbers of students were enrolled. The two intact groups were considered as samples for the study. One group was treated as a control group and another group as an experimental group for the study.

In the academic year 2015-16 at Department of Education (CASE), The Maharaja Sayajirao University of Baroda there were 36 students admitted in M.Ed. degree course. But after one month one student left this course because of some personal reason and one student met with an accident and therefore dropped of this course for one year. Hence researcher was left with 34 students in this group but at the end of intervention programme one student honestly denied to give information as she remain absent in almost all the sessions. Hence researcher was left with an effective sample size of 33 students. This group was treated as an experimental group in the study.

In this same academic year at RIE Bhopal there were 13 students admitted in M.Ed. degree course and all 13 were considered for as another group. Now this group was consider as a control group for the study.

1.20 Tools of data collection:

There were three tools used for data collection. Details for each tool are given below:

i. Entry level check on statistical data analysis techniques: In order to know the entry behavior of both the groups i.e. experimental and control groups an Achievement test was constructed and administered by the investigator on M.Ed. students. There were 40 items in this test. Each question carries one mark. The scores obtained on this achievement test were considered as covariates while doing hypothesis testing. This tool is based on four components. These four components were:

i. Frequency distribution
ii. Diagrammatic and graphical representation of data

iii. Measures of central tendency

iv. Measures of dispersion

This tool was validated by my Ph. D. guide and five other experts, namely, three subject experts, one psychology expert and one language expert. Suggestions by the experts were incorporated. Then the tool was administered on both the groups of the students.

ii. Achievement Test on data analysis techniques: An achievement test was constructed to study objective-2. This tool includes multiple choice questions. Each question carries one mark. Question in this tool were on the selected data analysis techniques only. This tool was also validated by my Ph.D. guide and other five experts namely, three subject experts, one psychology expert and one language expert. Suggestions of the experts were incorporated. There were 70 statements in this test. This achievement test was administered on both the experimental and control groups. The scores obtained on this achievement test were considered as "the test scores of experimental group" and "the test scores of control group", respectively.

iii. Reaction Scale: A reaction scale was constructed by the investigator which was used for knowing the impact of cooperative learning of data analysis techniques on M.Ed. students. The reaction scale was filled by experimental group of M.Ed. students at the end of implementing educational program. This tool consisted of 61 statements on six major components of cooperative learning (positive interdependence, equal participation, individual accountability, face to face promotive interaction, appropriate use of collaborative skills and group processing). This rating scale was validated by my Ph. D. guide and two subject experts, one language expert and one psychology expert.

1.21 Programme of the study:

❖ **Pre-requisites of the Programme:**

i. In the beginning only students were briefed about the expected behavior and the way of conduct required for a cooperative classroom. Following instructions were made by the researcher to the students:

- This subject is very interesting and we will learn it in groups.
- In group every member will help each other.
- In group every member need to participate and involve them.
- Here you have to give chance to others as well as take opportunities to participate.
- Try to understand others ways of thinking and defend your argument too.

- Involve yourself in healthy educational discussions.
- Don't ever use harsh or bad words for others.
- In a group task either you all swim together or you all sink together. Therefore all members of your group should have complete understanding about the task.
- Give chance to maximum members from your group to present the task.
- Every time you will fall in different group. So every member is your guide and teacher too.

ii. Every class (session) was of 90 minutes (45 + 45 minutes).

iii. The programme consisted of basic units of 5 or 6 students in each group. Each group was heterogeneous in terms of their disciplines and achievements of pre-test scores. The group formation of these 5 or 6 students was carried out through randomization.

❖ **Programme:**

- **Announcement of Topic:** Three days prior, the investigator announced the topic inside the class. Relevant references were also informed to the students.
- **Distribution of Task:** Students read from various resources about the topics. According to their friend circle, students form groups and distributed their tasks among themselves and then interacted. Here informal group exchange of information took place.
- **Individual or grouped learning of students:** Sometimes students read the topic in group and sometimes they prepared individually also.
- **Orientation to Topic by the investigator:** Here investigator used dialogue approach and major teaching points of the stated topic were shared in the classroom.
- **Creation of groups:** Here groups of 5 or 6 students were created randomly using calling number technique or selection cum randomization technique. Now every group of students was asked to sit in circular way. So that every member could see and interact with the every other member in the group.
- **Allocation of classroom assignment:** Here different problems related to concerned data analysis technique were provided to different group of students. Generally one problem is provided to two groups. Since there were usually five or six groups, the researcher provided three different problems. And 25 to 30 minutes were given to complete this task. Students interacted, discussed, distributed tasks among themselves and worked out solutions to those assigned problems.

- **Within group and between group interactions:** When students were able to solve the assigned problem within group. They presented their solution but if one group failed to solve their problem then the other group who was addressing the same problem helped the other group. In case both groups failed to solve their problem then other groups who worked on similar problem helped them. In some situations the investigator facilitated them.
- **Presentation of assignment:** Here one student randomly selected from their group presented the solution of the assigned problem on the black board. When so ever some additional inputs were given by other group of students they added at the end of presentation. Usually, 5 to 7 minutes were allotted for each presentation.
- **Summarizing the topic:** This task was carried by the investigator where major teaching points under the topic were recapitalized by the investigator.
- **Allotment of Home Assignment:** For practice the investigator assigned home assignment to the students. This assignment was common for all students. All students performed their assignment individually.
- **Announcement of a new topic:** At the end a new topic was announced for the next class and relevant references were also shared with the students.

1.22 Data Collection:

The study was conducted in the following manner and the data was collected in the following phases:

Phase 1: Designing of Lessons

The lessons for each selected topic were designed by the investigator and then showed to my Ph.D. guide. The lesson plans were modified. The dialogue approach and cooperative strategy were used in the designing of lesson plans. There were total 26 lessons designed, in which 12 were on Descriptive Statistics, 4 were on Basics Concepts of Inferential Statistics, 7 were on Parametric Test and 3 were on Non-Parametric Tests. These lessons were designed keeping in mind the six basic components of Cooperative learning namely, Positive Interdependence, Equal participation, Individual Accountability, Face to Face Promotive Interaction, Appropriate Use of Collaborative Skills and Group Processing. Every lesson was consist of four basic components namely, *Comprehension of Available Information (Data), Identification of Appropriate Data Analysis Technique (i.e. Suitable to Data and can Respond to the Query of Data Analyst), Use of Data Analysis Technique, Interpretation of obtained Results.* (Appendix – VII)

Phase 2: Seeking Permissions

The investigator sought permissions from the Heads of both the institutions, namely, Prof. S.C Panigrahi, Head of the Department of Education (CASE), Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara and from Prof. H. Senapaty, Principal, Regional Institute of Education, Bhopal for conducting study in these institutions.

Phase 3: Testing for Entry Level of M.Ed. students

Entry level checks on statistical data analysis techniques tool were constructed and administered by the investigator on both the experimental and control groups and scores were obtained from them.

Phase 4: Conducting Classes

For each selected topic of data analysis techniques class were engaged by the investigator on experimental group of students. Each topic was treated through cooperative learning strategy.

Phase 5: Construction and administration of Achievement test on data analysis techniques

An achievement test was constructed by the investigator based on the content analysis for the selected topics of Statistical data analysis techniques. Each item was related to the specific instructional objective. The test was validated by two subject experts, one language expert and one psychology expert. This achievement test was administered on all the M.Ed. students of both the groups, that is, experimental and control group. Hence, achievement scores of both the groups of students were obtained.

Phase 6: Construction and Administration of Reaction Scale

A reaction scale was constructed and administered on only experimental group of M.Ed. students to study the impact of Cooperative learning of data analysis techniques on them. Students were asked to give their reactions against each statement and then the completed reaction scale was collected back by the investigator.

1.23 Data Analysis Techniques Employed:

In this study following data analysis techniques were used with respect to each objective:

Table 4: Data Analysis Techniques With Respect To Research Objectives

Sr. No	Objective No.	Technique
1	I	Nil
2	ii	**Scatter plot:** To check linearity in dependent (post achievement test score) and covariates (entry level check on statistics data analysis techniques) of

		both groups (experimental group and control group). **ANOVA:** To check statistically, to test the hypothesis: There is no significant interaction between the treatment (post achievement test scores) and covariates (entry level check on statistics data analysis techniques). **Levene's Test of equality of error variance:** Testing for homogeneity of variance. **ANCOVA:** To test the significant difference between the mean scores of post test achievement scores of the two groups (experimental group and control group).
3	**iii**	**Cronbatch's Alpha:** To check reliability of the reactions made by Experimental group of students through the administered reaction scale on them. **Scatter Plot and correlation coefficient:** Scatter Plot of Cooperative Scores Vs Achievement Scores and the respective correlation coefficient. **Graphical Representation And Descriptive Statistics:** For Six Essential Components of Cooperative Learning and their interpretations. **Frequency distribution:** frequency distribution of the reactions made by Experimental group of students through the administered reaction scale on them. **Chi-square test:** There will be no significant difference in the observed frequencies and the expected equally distributed frequencies.

1.24 Findings of the Study:

The findings of the study are as follows:

i. The mean achievement score of the experimental group of students (i.e. the students learnt data analysis techniques through cooperative learning) is significantly high than the mean achievement score of the control group (i.e. the students learnt data analysis techniques through traditional method).

ii. There is high positive correlation between the cooperative score and the achievement score of the experimental group of students. It means that with an increase in cooperative score achievement score is also increased.

iii. For the components of cooperative learning (i.e. positive interdependence, equal participation, face to face promotive interaction, individual accountability, appropriate

use of collaborative skills and group processing) the coefficient of skewness is significantly highly negative which indicates that most of the students have favourable or positive attitude towards learning of data analysis techniques through cooperative strategy.

iv. Using chi-square test it is found that students gave favourable reaction towards "Every member was having positive outlook to accept the task".

v. Using chi-square test it is found that students gave favourable reaction towards "Every member helped each other to complete the task".

vi. Using chi-square test it is found that students gave favourable reaction towards "Every member was fully involved in the task".

vii. Using chi-square test it is found that students gave favourable reaction towards "Every member respected the other ones".

viii. Using chi-square test it is found that students gave favourable reaction towards "Encouragement and support were provided mutually".

ix. Using chi-square test it is found that students gave favourable reaction towards "All the members converged on the solution".

x. Using chi-square test it is found that students gave favourable reaction towards "All members were involved to achieve the task".

xi. Using chi-square test it is found that students gave favourable reaction towards "Every member was treated equally".

xii. Using chi-square test it is found that students gave favourable reaction towards "Participation in team brought self confidence and fearlessness".

xiii. Using chi-square test it is found that students gave favourable reaction towards "Every member participated and presented".

xiv. Using chi-square test it is found that students gave favourable reaction towards "Members posed questions to each other".

xv. Using chi-square test it is found that students gave favourable reaction towards "Members listened to each other".

xvi. Using chi-square test it is found that students gave favourable reaction towards "All the members got chance to express their ideas to one another".

xvii. Using chi-square test it is found that students gave favourable reaction towards "There was discipline during the interaction".

xviii. Using chi-square test it is found that students gave favourable reaction towards "Members discussed in-depth to understand thoroughly".

xix. Using chi-square test it is found that students gave favourable reaction towards "Members were probing deeply together".

xx. Using chi-square test it is found that students gave favourable reaction towards "Members were explaining thoroughly".

xxi. Using chi-square test it is found that students gave favourable reaction towards "Very often interactions occurred during presentations".

xxii. Using chi-square test it is found that students gave favourable reaction towards "Students were always interested in learning in cooperative setup".

xxiii. Using chi-square test it is found that students gave favourable reaction towards "Every member of the team was eager to complete the task".

xxiv. Using chi-square test it is found that students gave favourable reaction towards 'Every one accepted the assigned role in the team".

xxv. Using chi-square test it is found that students gave favourable reaction towards "Every one completed the accepted task".

xxvi. Using chi-square test it is found that students gave favourable reaction towards "Every one contributed ideas, thoughts and suggestions to the team".

xxvii. Using chi-square test it is found that students gave favourable reaction towards "Members helped other team members if they faced difficulty".

xxviii. Using chi-square test it is found that students gave favourable reaction towards "Personal assignments were completed regularly".

xxix. Using chi-square test it is found that students gave favourable reaction towards "Everyone got chance to represent their own team in the presentation'.

xxx. Using chi-square test it is found that students gave unfavourable reaction towards "All were regular in the class" because some students were not regular present in the class.

xxxi. Using chi-square test it is found that students gave favourable reaction towards "All the team members were engaged in the completion of task".

xxxii. Using chi-square test it is found that students gave favourable reaction towards "The team members were treated respectfully".

xxxiii. Using chi-square test it is found that students gave favourable reaction towards "All the team members observed high moral".

xxxiv. Using chi-square test it is found that students gave favourable reaction towards “Tasks were distributed properly among the team members”.

xxxv. Using chi-square test it is found that students gave favourable reaction towards “Conducive environment of learning was created”.

xxxvi. Using chi-square test it is found that students gave favourable reaction towards “Time was managed properly”.

xxxvii. Using chi-square test it is found that students gave favourable reaction towards “Suggestions of all the members were considered”.

xxxviii. Using chi-square test it is found that students gave favourable reaction towards “Team members were properly instructed”.

xxxix. Using chi-square test it is found that students gave favourable reaction towards “It was a collective learning through participatory approach”.

xl. Using chi-square test it is found that students gave favourable reaction towards “Interactions were done in a healthy learning environment”.

xli. Using chi-square test it is found that students gave favourable reaction towards “Every member was free to ask and respond to the questions”.

xlii. Using chi-square test it is found that students gave favourable reaction towards “Every member got chance to express the ideas”.

xliii. Using chi-square test it is found that students gave favourable reaction towards “Members were free to interact in different languages (Hindi, English & Guajarati)”.

xliv. Using chi-square test it is found that students gave favourable reaction towards “Members paid attention to the speaker”.

xlv. Using chi-square test it is found that students gave favourable reaction towards “Members were ready to work in randomly selected teams”.

xlvi. Using chi-square test it is found that students gave favourable reaction towards “All members were allowed to express their ideas”.

xlvii. Using chi-square test it is found that students gave favourable reaction towards “Ideas of all were used to solve a problem”.

xlviii. Using chi-square test it is found that students gave favourable reaction towards “There was full faith in the work done by others”.

xlix. Using chi-square test it is found that students gave favourable reaction towards “Other’s explanations were relieved on”.

l. Using chi-square test it is found that students gave favourable reaction towards “Team work was fully observed”.

li. Using chi-square test it is found that students gave favourable reaction towards “Credit of success/failure was attributed to all members of the team”.

lii. Using chi-square test it is found that students gave favourable reaction towards “All the ideas were comprehended to arrive at a common solution”.

liii. Using chi-square test it is found that students gave favourable reaction towards “Team members were directed to carry out the distributed task”.

liv. Using chi-square test it is found that students gave favourable reaction towards “Results were drawn by summarizing the work of all team members”.

lv. Using chi-square test it is found that students gave favourable reaction towards “All were made emotionally & mentally ready to work in a team”.

lvi. Using chi-square test it is found that students gave favourable reaction towards “Members were convinced logically on their arguments”.

lvii. Using chi-square test it is found that students gave favourable reaction towards “Necessary arrangements were made to work in a team”.

lviii. Using chi-square test it is found that students gave favourable reaction towards “Conflicts were resolved amicable”.

lix. Using chi-square test it is found that students gave favourable reaction towards “New teams were constituted in the progressive class”.

lx. Using chi-square test it is found that students gave favourable reaction towards “Members were selected randomly for team formation”.

lxi. Using chi-square test it is found that students gave favourable reaction towards “Team goals objectives were made clear to all the team members”.

lxii. Using chi-square test it is found that students gave favourable reaction towards “Each team work was assessed periodically by the teacher”.

lxiii. Using chi-square test it is found that students gave favourable reaction towards “Actions facilitating learning in this setup were promoted”.

lxiv. Using chi-square test it is found that students gave favourable reaction towards “Futile actions were dropped”.

From statement No. (iv) to (lxiv) it is found that students gave favourable reactions towards the cooperative environment setup while learning data analysis techniques through cooperative

learning strategy. Only in one statement i.e. “All were regular in the class”, favourable response was not received as some students were not regular in class.

1.25 Study Based Reflections:

This study brings an insight about the use of cooperative learning while learning data analysis techniques in M.Ed. Programme, in turn how cooperative learning enhances the understanding and achievement scores of students while learning data analysis techniques at M.Ed. Programme. In our country India the quality of research is a big issue of concern for all of us. For improving the quality of research, teaching learning processes of research methodology that is specifically apt use of data analysis techniques is of high concern for educationists. This present piece of research has proved that the teaching – learning process of data analysis techniques through cooperative learning at M.Ed. programme can bring better results in terms of their achievement scores and learning environment in the classroom. Here research found that cooperative learning is a very useful technique for learning data analysis in M.Ed. programme. From the present study following are the reflections emerged:

- This study provides an insight into joyful, cohesive and grouped learning of data analysis through cooperative learning.
- This study shows that cooperative learning helped the students to score well in academic achievements.
- This study shows that there is a continuous evaluation of students as during the learning and at the end also evaluation is carried out. Therefore formative and summative evaluation both are considered.
- This study built strong foundation for putting theory into practice.
- This study perfectly portray that cooperative learning is a student centric approach and can create better learning environment.
- This study viewed that student as active learner and students were engaged properly throughout the classroom.
- This study highlights the role and responsibility of the student and teacher for organizing cooperative learning environment.
- This study shows that students are motivated to take academic initiatives in terms of reading new topics at their own, discussing their quarries among friends and group members, presenting their ideas, keenly listening others, reflecting upon others arguments

and suggestions, solving internal conflicts, leading the groups, managing time, giving opportunities to other students, communicating properly, comprehending ideas, synthesis and assimilation of ideas etc.

- This study shows that Cooperative learning gives scope for self study as well as group study.
- This study shows that Cooperative learning helps in attaining the goals of higher education like student can read and understand the content by their own, write and express their own ideas to others.
- Group work and discussions helps the students to bring positive attitude towards research. Also helps in understanding the realm of research.
- It is observed by the researcher that students used library books as well as internet for acquiring the knowledge about the allotted topic.
- The ability to analyze and synthesis ideas enhances while learning through cooperative learning.
- Certain academic skills also enhanced or developed among students like putting ideas in front of experts and peers, putting argument logically, violating arguments logically, synchronizing ideas, comprehending the overall ideas, summering the content, thinking critically etc.
- Through cooperative learning students got scope to think divergently.
- Cooperative learning gives freedom in learning mode like from books, videos, internet etc ….individual study or group study.
- Face to face interaction during the group interaction and presentations makes long lasting impression on student's memory.
- Cooperative learning helps the students to develop team spirit, learning in team and accomplish the task collectively.
- Cooperative learning realized the students to float together or sink together.
- Students have raised their problem solving skill through group learning.
- The role of teacher is also crucial as teacher has to act like a facilitator, topic orienter, task manager, conflict manager, guider if needed, keen listener and observer and evaluator.
- Workshops and orientations must be provided to M.Ed. students and teachers regarding use of cooperative learning technique in teaching learning process.

1.26 Implications of the study:

On the basis of findings and reflections of the study following are the implications of this study:

- Cooperative learning should be used and promoted as a major teaching – learning strategy in M.Ed. programme at the time of learning of data analysis techniques.
- Institution should provide congenial environment for both teachers and students to use cooperative learning technique in learning process.
- Institution should provide suitable infrastructure and facilities which help the teacher to make use of cooperative learning technique in an effective manner. Under infrastructure and facility researcher means that the seating arrangement of students, internet facility, sufficient books in the library, students reading hall or room etc.
- Flexibility should be given to learners in terms of self study, peer group learning or classroom learning.
- Cooperative learning provides an opportunity for students to reflect on their own learning and teaching to their peers.
- Teacher should facilitate students in advance with various resources related to the upcoming topic to be taken in class. It can be by sharing names of books available in the library, various links from the internet, various articles from journals, various videos from internet etc. so that teacher can play a proper role of facilitator to the students.
- Through cooperative learning technique interest of the students rose which brings change in terms of gradual rise in attendance and their achievement scores.
- M.Ed. students and their teachers both should get more orientations and workshops on use of cooperative learning from the experts.
- In case teacher or students faces difficulty to administer cooperative learning then there must be a platform where teacher can resolve their difficulties with the keen advice of an expert in the area of cooperative learning.
- For the teachers and students both who employed cooperative learning successfully should be given recognition and applause in the institution so that they will continue with this teaching learning strategy in the institution.
- Through cooperative learning both Summative and Formative Assessments can be given due importance in evaluation process.

- Assignment bank and evaluation techniques can be created by the teachers and shared by them with other institute teachers which can help them in designing and implementing cooperative learning in their institutions.
- In cooperative learning the regular assignments helps students to reflect upon their learning.
- Use of ICT can be integrated as a catalyst of cooperative learning. Now a days WhatsApp, Blogger, You- tube and internet can be an effective means of sharing knowledge.
- Better human values can be instilled or enhanced among the students like mutual adjustment, listening others view, leading group, presenting group, cooperation, mutual respect, resolving conflicts etc.
- Cooperative learning provides an opportunity to the Students to develop reading and understanding ability of text related to statistical data analysis techniques.
- The size of the class should be under consideration by the policy makers and the institution authority as the feasibility for implementing cooperative learning depends on the class size also. So class size should not be too large. It should be at the most 40 to 50 students in a class where 7 to 9 groups can be formed.

1.27 Suggestions for further Research:

Any piece of research work conducted opens up new areas for further research. In the present study the researcher has made an effort to study the effect of cooperative learning on achievement scores of M.Ed. students in learning of data analysis techniques and has found to be effective. This study has also created new avenues for more researches in the field of education as follows:

- Research could be conducted on studying the effect of cooperative learning on achievement scores of M.Ed. students in learning of qualitative data analysis techniques.
- Research could be conducted on studying the effect of cooperative learning on behavioral changes and skill acquisitions of M.Ed. students.
- Research could be conducted on studying the effect of cooperative learning on achievement scores of M.Ed. students in learning of different subjects or papers.
- Research could be conducted on studying the effect of cooperative learning on enhancement of interest and aptitude of students towards the discipline.

- Research could be conducted on studying the effect of cooperative learning on inculcation of humane and professional values among the students.
- Research could be conducted on studying the effect of cooperative learning on attendance rate of the students in professional programmes like MBA, MCA, BBA, MEd, BEd and PGD courses etc.
- Research could be conducted on various subjects employing cooperative learning.
- Research could be conducted on use of cooperative learning at various levels of Teacher education programmes.
- Research could be conducted on providing orientation or workshops on implementation of cooperative learning on Teachers at College and University levels.
- Research could be conducted to study the challenges faced by teachers in planning, organizing and implementation of cooperative learning at different levels of teaching.
- A comparative research could be conducted to study the students' concept retention level undergoing through cooperative learning and conventional method of teaching – learning process.
- Research could be conducted to study the extent to which six essential elements of cooperative learning are retained in students after completion of existing programme.
- Research could be conducted to study the impact of cooperative learning on motivation for learning of low achievers, average achievers and high achievers in the class.
- Research could be conducted to study the effect of cooperative learning on problem solving ability and skill of adjustment of the students.

1.28 Conclusion:

Drawing meaningful information from a huge data is an essential requirement. This study makes an attempt that M.Ed. students could understand, use and interpret the results properly. Cooperative Learning strategy was found an effective means for M.Ed. students to learn data analysis techniques in terms of their achievement scores. It was also observed that the interest and enthusiasm of the students were high in attending these classes and because of this there was a great reduction in absenteeism of students in classroom.

While employing Cooperative Learning the role of the teacher is very challenging in the sense that the teacher needs to direct, facilitate and lead the class. In Cooperative learning, teacher

needs to motivate the students' continuously, developing trust among them so that they can read, understand and present the content.

Every discipline has its own language. Similarly research also has its unique language. Learning and using those technical terms in the description of the content gradually improved. So the fear of this discipline eradicated progressively among the students. Along with this change students have developed certain skills which need to be sharpened in any professional course like communication skill, presentation skill, listening skill, team building skill, respecting others, finding opportunity, leading the group, adjustment skill, idea expressing skill, trusting others, decision making skill, peer accountability and individual accountability and, conflict management skill. Along with these skills and values reading, comprehending, analyzing and reflecting ability of students were also developed.

According to the recent NEP (2019) draft, "Research and innovation at institutions in India, particularly those that are engaged in higher education, is critical. Evidences from the world's best universities throughout history show that the best teaching and learning processes at the higher education level occur in environments where there is also a strong culture of research and knowledge creation". Therefore Higher Education institutions should employ such teaching-learning strategies which can develop the students' personal, academic and professional skills and abilities in the best possible manner. And it is found that cooperative learning is one of such teaching – learning strategy which gives ample scope and opportunity to students to grow and learn in a best possible manner.