

## Chapter 4

### Findings and Discussion

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In this chapter researcher presents findings of the study followed by discussion.

#### 4.1 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”.
- xlili. Using chi-square test it is found that students gave favourable reaction towards “Members were free to interact in different languages (Hindi, English & Gujarati)”.
- 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”.
- I. 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.

## **4.2 Discussion on the Results of the Study:**

Discussion is based on the received findings of this study and the past researches and theories which were carried out on cooperative learning and data analysis techniques.

### **4.2.1 Cooperative Learning and Achievement Scores of M.Ed. Students on Data Analysis Techniques:**

Students learn in many states like individual, competitive or in cooperative manner. Johnson (2001) states that from almost 600 experimental studies and over 100 correlation studies on cooperative learning since 1898 the three major outcomes are achievement/productivity, positive relationships, and psychological health. The studies which were conducted by many researchers are of various decades with subjects of different age groups, of different subject disciplines and in different settings. These researches confirmed that results of cooperative learning are more favorable than competitive and individualistic ways of learning. The most common results obtained by various researches are higher achievement and greater productivity, more caring, supportive, and committed relationships, greater psychological health, social competence, and self-esteem. These studies delineate positive effect that cooperative learning has on student's academic achievements and social development. Johnson (1987) carried Meta analysis of 122 studies on cooperative learning during 1924 to 1987 conveyed that cooperative learning accelerates achievement of the students of all age groups and in almost all subjects. Johnson et.al (2000) conducted Meta analysis of 164 studies investigated eight cooperative learning methods namely Academic Controversy (AC), Student-Team-Achievement-Divisions (STAD), Teams-Games-Tournaments (TGT), Group Investigation (GI), Jigsaw, Teams-Assisted-Individualization (TAI), and finally Cooperative Integrated Reading and Composition (CIRC) were found with positive impact on students achievements as compared with competitive learning and individual learning. It was also mentioned that the validity of cooperative learning can be measured from its consistency of the results and the diversity employed in cooperative learning methods on students. In the present study researcher obtained results as high achievement scores of the experimental group of students as compared to control group of students. Unfortunately researcher did not come across with any previous research on data analysis technique taught through cooperative learning. More over dozens of researches were carried on school subjects like Science, Mathematics, Social Science, languages like English, Foreign languages, various Mother tongues like Gujarati, Hindi etc, physical Education etc but

now in higher education and in professional courses like Nursing, MBA, cooperative learning method of teaching is used and favourable results were also obtained.

Dumont (2010) cited Slavin (1995, 2009) and Salvin, Hurley & Chamberlain (2001) stated that the four major theoretical perspectives held by different researchers on the achievement effects of cooperative learning are motivation, social cohesion, cognitive – development and cognitive – elaboration. [Casanova](#) & [Alvarez](#) (2012) delineate the concept of virtual cooperative learning and the main inter-psychological mechanisms accounting for its effectiveness. They found that the main inter-psychological mechanisms involved in peer cooperation are positive interdependence, construction of meaning and psychological relations.

[Pons](#) et. al. (2013) found that teacher training program on development of Cooperative Learning Methods (CLM) instructional designs based on eight categories is effective through cooperative learning technique. Zakaria et. al. (2013) found that students had gain a significant effect on mathematics achievement through cooperative learning as compared to traditional learning. It was also revealed that students learnt through cooperative learning were able to increase their understanding and to develop their self-confidence. [Ahmadi](#), et. al. (2014) investigated that the writing achievement gain through cooperative learning on TOEFL essays of Iranian intermediate students' was significantly better than the traditional learning. [Wei](#) & [Tang](#) (2015) found that cooperative learning improves students' English Academic achievement as an active, passionate, cooperative learner. Students develop ability to integrate and communicate in English in real situation during the learning procedure. [Rocca](#) (2015) studied the online cooperative learning activities done by the students of Department of Education at Roma Tre University (Italy) of the academic year 2013-14 in two academic courses i.e. “General Didactic” (GD) at First-level Degree in Education Sciences and “Educational Strategies and New Communication Processes” (ES) at Second-level Degree in Professional Community Educator. They found that the average achievement scores of students studied from cooperative learning in the exam of “General Didactics” is significantly greater than the others who studied from conventional learning technique. Even the standard deviation of the achievement scores of students learnt from cooperative learning was low as compared from others. Mahamod & Somasundram (2017) found that students gave a positive respond towards the effectiveness of cooperative learning in terms of achievement and motivation while learning of Malay language in school. Guerrero et. al. (2017) found that jigsaw is more effective learning technique for nursing profession as compared

to traditional teaching technique in terms of high achievements of the students and developing skills like leadership and social engagements. [Gamit](#) et. al. (2017) found that cooperative learning has significantly improved the achievement scores of students in mathematics learning. It was also determined that attitude of students towards mathematics learning has also improved as students shows positive perception towards the subject Mathematics. Uno & Katayama (2017) stated that as nursing is an inherently interpersonal occupation, communication is an important element in nursing training. The study concluded that Cooperative learning was found effective in improving communication skill of nursing students. Chebii et. al. (2018) found the outperformed achievement scores of students learnt chemistry through Co-operative E-learning approach (CELA) as compared to conventional teaching method. They have also suggested that cooperative learning should be included in regular pre-services and in-service training of Chemistry teachers in Kenya. [Wang & Hu](#) (2020) suggested that Management (bi-lingual) class based on cooperative learning is feasible and is an effective mode of learning which can provide better achievement of students and teachers both. Many studies were conducted by different researchers in many countries with different cooperative learning methods which states that cooperative learning brings positive change in the achievements of the students. Here also researcher has obtain similar results as of mentioned above that achievements of experimental groups of students gain significantly high scores than the control group of student in learning of data analysis techniques in M.Ed. programme.

In concluding paragraph of Johnson et.al. (2000) mentioned in “Cooperative Learning Methods: A Meta – Analysis” report it was claimed that “many of the studies conducted on the impact of cooperative learning methods on achievement have methodological shortcomings and, therefore, any differences found could be the result of methodological flaws rather than the cooperative learning method. In the future, researchers should concentrate on conducting highly controlled studies that add to the confidence with which their conclusions will be received”.

#### **4.2.2 Cooperative Learning and Their Six Essential Elements:**

In this study researcher has used six essential elements of cooperative learning namely, Positive Interdependence, Equal participation, Individual Accountability, Face to Face Promotive Interaction, Appropriate Use of Collaborative Skills, group processing. All these six elements were considered by the researcher and because of that certain associated skills and values were



also developed among the students like initiators, responsible, motivators, self-esteemed, confident, cooperative, supportive, conflict manager, communicative, leader, work compiler, presenter, decision maker, task manager, disciplined, task orienter, success or failure acceptor, working as a team, individual as well as group guider, enjoying the task while working etc. Here are some previous researches and theories which talk on the similar lines.

According to the business dictionary, “the silo mentality is a mindset present when certain department or a team does not wish to share information with others in the same company”. This trait of human behavior is also being found among the NEP (2019) draft which states that silos should be breakdown among the disciplines. Since Cooperative learning helps in creating a cooperative and congenial environment for learning it will definitely restrict silos mentality among students as sharing and caring are the foundations of Cooperative Learning.

Like Deutsch recognized that students can view their peers as an individual, as a competitor and a cooperative one in learning process. Further Deutsch (1949) stated that the effort of a student to reach his goal has, a supportive effect in the cooperative case, an obstructive effect in the competitive case and a neutral effect in the individualistic case on the other students. According to Slavin (1991), “For enhancing student achievement, the most successful cooperative learning approaches have incorporated two key elements: group goals and individual accountability. Positive effects have been consistently found on outcomes such as self-esteem, intergroup relations, acceptance of academically handicapped students, attitudes toward school, and ability to work cooperatively”. Towns & Grant (1997) delineate graduate students perceived interpersonal skills and communication skills through use of cooperative learning. Johnson and Johnson (2001) cited that “a doctoral student at the University of Dublin Trinity College School of Education wrote a research paper about the effectiveness of cooperative learning on the development of academic achievement, social skills, friendship patterns, academic self-image, self-esteem and student attitudes on Sixth Class students in an urban Irish primary school. The research was conducted over a two year period and the results were very much favorable in areas of cooperation, teamwork, and tolerance of others and positive self esteem”. [Song](#) et. al. (2012) explored that cooperative learning can promote students mastery of technical skills; improvement in some extent to mental health of students; improvement in students panic mood; help to relieve level of stress; help to improve interpersonal skills of students and effect is remarkable. [Umemoto](#) & [Yada](#) (2016) traced that usefulness of cooperation positively predicted

self-efficacy and intrinsic value. Moreover, self-efficacy and intrinsic value positively predicted behavioral engagement, and intrinsic value positively predicted emotional engagement. On the other hand, individual orientation negatively predicted intrinsic value and inequity did not predict any motivational factors. [Kamaruddin & Yusoff](#) (2019) suggested that Cooperative Learning Model Jigsaw and Team Games Tournament are highly effective in term of enhancement of social basic skills as aspects of language skills, communication skills and collaborative skills in students while learning Islamic education subjects of Hadith. The intension behind this study was to benefit the District Education Office, the State Education Department and the Curriculum Development Division of the Ministry of Education to increase information, to improve the existing Islamic Education pedagogical modules as well as changing the exam oriented pedagogy to skills oriented pedagogy at Malaysia.

There are many more studies which support cooperative learning in either enhancing or developing favourable academic skills and values among the students like Bridgeman (1977), Battistich & Watson (2003), Ryan et. al (2004), Johnson and Johnson (1994), Damon (1984), Murray (1982), Jordan & Metais (1997), Ballantine & Larres (2009), Johnson et.al. (1981) and salvin (1983).

#### **4.2.3 Cooperative Learning and Attitude of Students towards Discipline:**

In many studies it is been observed that when students learn some subject through cooperative learning their attitude towards the subject become more positive and students appreciate that subject more as compared to earlier. In this study also it is evident that students attitude becomes more favourable towards the subject and hence the correlation between the cooperative scores and achievement scores was quite significant i.e. 0.653. Moreover the attendance of the students was also improved. Few previous researches related to development of positive attitude towards the subject taught through cooperative learning are mentioned like, Onwuegbuzie (2001), as a result of cooperative learning students has developed good attitude towards the subject, school, self – esteem, self efficacy, motivation and good relationships with classmates and regular attendance in school. [Gamit](#) et. al. (2017) determined that attitude of students towards mathematics learning has also improved as students shows positive perception towards the subject Mathematics on learning of concepts through cooperative learning. Chien (2004) and Chandrasekarac (2012) revealed that student's attitude has improved significantly towards

learning of subject. In the similar lines many more researches can be listed to show that cooperative learning is quite effective in enhancing and developing the positive attitude towards the discipline and the subject to learn.

#### **4.2.4 Student's Reactions towards the Educational Programme through Cooperative Learning:**

When students enjoy learning the extent of learning is usually high. In cooperative learning students were found with positive outlook for their classmates and their group members. Students revealed that they take mutual help of their group mates in learning, they have earned and paid mutual respects for their group mates, they have encouraged and provided mutual support to their group mates, participation of all students in the group were encouraged, students participation in team brought fearlessness and confidence in learning the subject, team members asked questions, replied questions and listened mutually, they worked in discipline, students eagerly accepted and accomplished their group's tasks, conducive environment was created by the students for learning, students were free to interact in Hindi, English and Gujarati languages, students were developed their communication skill, students trusted other's explanations and ideas to deal with a problem and credit to success and failure was given to the entire team members, students were convinced to work in team and if conflicts occurs they were resolved amicably, Futile actions were dropped and useful actions for learning were continued. Individual assignments were assessed by the teacher periodically, opportunity was given to participate and present their solution by the students in front of the class. Some of the previous year's researchers also give similar evidences like Agashe (2000), Wang (2006), Zainun (2001), Mazlan (2002), Whicker et.al. (1997), Thurston et.al.(2010), BiBi (2002), Gupta (2004), Veenman et.al. (2002), Singhanayak & Hooper (1998) Mehra & Thakur (2008), suggested that students have positive attitude towards group activities. The findings of the present study indicate that students were benefited both academically and socially through Cooperative Learning.