Comparative Analysis of Peer Tutoring and Conventional Strategies in Students' Performance in Chemistry

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Abstract

The prime objective of the study, therefore, was to take a comparative analysis of peer tutoring and conventional strategies in students' performance in subject of chemistry at secondary level. Other study objectives included determining the effect of peer tutoring on students' academic achievement in the subject of chemistry in terms of pre- and post-test scores, as well as comparing the performance of students taught using peer tutoring and traditional instructional strategies in chemistry on a Multiple Type Questions taken on the Board pattern. Furthermore, the research attempted to compare the performance of students taught in chemistry utilizing peer tutoring vs standard instructional methodologies. Seven thousand two hundred twenty male students attending secondary and higher education institutions in Tehsil Muzaffargarh were recruited at random or counted as the population for the purpose of this research. Instead, the study's sample size was 95 students taken from two entire 10th grade classes at Khan Pur Bagga Sher Government High School. The peer tutoring strategy was used in a single classroom with 48 students (the "Experimental group"). The other 44 children in the "control group," on the other hand, were taught using more traditional approaches. A before and after comparison test technique was employed in the acquisition of the information. SPSS was used to analyze the data, and descriptive analysis methods such as the independent t-test and the paired sampling test were utilized for validation. Academic attainment was shown to vary considerably between the experimental group, which was taught using the peer tutoring methodology, and the control group, which was taught using the standard teacher-led method. The experimental group was instructed using the peer tutoring approach. Furthermore, the study's results provide support to the concept that having students learn from their peers may improve their general comprehension of chemistry. Both in terms of the disparity between tutoring groups and the students' academic achievement. To summarize, the results of this research have significant significance for educators, school administrators, and lawmakers interested in enhancing the academic performance of chemistry students.

1. Introduction

With the up gradation and gradual movement towards the research in science sector like scientific discipline and educational areas, pupils are the major subject matter of the discussion of the educators. The educational sector has developed a noteworthy progress in growth about the character of human learning and therefore the circumstances have enhanced the assorted areas of the educational development (Grubs, 2009). You may read more about the definition of peer tutoring offered by Scruggs Mastropieri and Marshak (2012) by clicking on the link provided above. This involves giving instructions to students who are working in pairs to include their classmates in their research (Ryan & Deci 2000).

It is also true that the approaches of systematic peer-mediated education and peer tutoring are equal to one another (Rohrbeck, Ginsburg-Block, Fantuzzo & Miller 2003). It was developed by Castle, Castle, and Castle as a collaborative learning strategy in which students work together to solve problems (2007). While Sporer and Brunstein (2009) indicated that students who worked in pairs did this as a method to increase their learning capacity, we believe that this statement to be incorrect (Mayfield & Volmer 2007).

It's when you pick up fresh information from other students in your social circle at school who have similar interests as you do. According to Wadoodi and Crosby (2002), this kind of education may be described as one in which large groups of students are divided into smaller groups of two persons each in order to provide more individualised learning. Topping (2008) found that students benefited just as much from having mixed-age tutors as they did from having peers as their mentors in terms of their personal and social development and their drive. It's possible that teachers will concentrate on each student as an individual.

Burnish, Fuchs, and Fuchs (2005) used peer tutoring in students who had appropriate tutor training to improve academic performance. Aguayo et al. (2017) ascertained a rise in linguistics process by the effect of the peer tutoring and learning wherever mutual understanding and cooperation increased to promote the teaching, learning and peer tutoring process at primary, elementary and secondary level.

More ever, it’s additionally expressed that motivation is associate degree factor that's place into concentrate of the mutual cooperation and understanding to one another (Santee & Garavalia, 2006; Topping, 1996). Human beings learn more if they repeat same behavior many times, and therefore the theory behind this kind of learning in most western faculties is viewed through the viewpoint’s creative person (Gan, 2008). Peer tutoring programs are getting a lot of widespread among the high and better education establishments. Topping (1996) outlined that mutual learning of the students or peer because the “achieving of data and ability of working through positive serving to students and coordinating among standing equal or compared with peers”. The peer tutoring concentrates on individuals from similar and in grouping during the classroom work.

Shabani et al. (2013) have themed that the peer teaching as cooperative learning methodology supported by the thought of peer students. World Health Organization (2020) shares a typical goal and ‘asymmetrical’ relationship. Peer tutoring is associate degree filmable, peer-intervened technique that features understudies filling in as scholastic coaches and tutees. Here reasoned that the next playacting understudy is combined with a lower playacting understudy to audit basic pedantic or conduct concepts. However, the term peer tutoring is employed to incorporate each variety. It’s additionally seen that some studies have reported that there’s more issue as a natural peer tutoring occurs.

Damon and Phelps (1993) described the peer learning or teaching is usually referred to as "cross-age" tutoring, as a result of the tutor are sometimes 2 or a lot of old years among the tutee. In going to deep sense of thought, the "peer tutoring" is an object of associate degree. The tutor may well be elder than the learner in cross age tutoring that generally this is often accustomed embrace each variety. The proper definition of peer tutoring was given by the

Damon and Phelps (1989), they stated that it is associated with the degree in which one kid having a linked with other kid in material on which the first is a professional and the second is an inexperienced student.

Comfort (2011) explained that it could be a group of the activities, disciplines, coaching and enlightenment within which experienced students facilitate and get knowledge by guiding one another. Colvin (2007) also described that its associate degree tutorial system within which students teaches alternative students. Bombardelli (2016) expressed that it happens once tutor and learner are at a similar age. However, several definitions of peer tutoring are present, and that all don't seem to be consistent. For example, all groups of peer tutoring are not expert. They are generally assigned tasks to teach or help their class fellows of same age or different or cross age groups in their studies (Greenwood et al., 1989; Palincsar & Brown, 1986) or equal level of class grade means same class (Comfort & McMahon, 2014).

Saito (2008) opined that for the achievement of the good and healthy peer tutoring process, acquisition to gain of information is not depending on the definition of the terms, disciplines, processes, memories and knowledge but it is consisted on the active interrelation of the students in peer tutoring procedure. The term "peer tutoring" is usually overlapping with each different age and equal age tutoring. Saito (2008) also states that the peer tutoring happens once tutor and tutee having the same or equal age and if the tutor having large age than the learners called as cross-age tutoring. However, the pairing in the different age groups of students is not confusing, it is only on the academic performance of students in class room or in groups form. Similarly, the pairing of same groups of students can be taken for study purpose (same-age group) in peer tutoring technique of teaching learning process (Dishion, 1999).

Finally, it has been seen that in mutual instruction method as in peer tutoring method different conceptual terms are used like peer tutoring in same groups or in different age groups that are commonly used in tutoring process and verbal conversation or communication constantly (Buzbee, 2005). On the premise of various definitions of the peer tutoring, there are five major styles of the peer tutoring.

Firstly, category wide peer tutoring within which each student within the category is linked with each other's in classroom, teachers gave a lesson as to the tutor students and tutor students gave the same lesson to their other students like tutee. Secondly, cross-aged tutoring is that within which students in higher grade levels. World Health Organization works with younger students. Thirdly, one to one tutoring suggests that one tutor, one student – it's as straightforward as that. A matched tutor solely works with one student at a time, between half-hour and one or two hours with a toddler. Fourth, small group instruction sometimes follows whole group instruction to bolster or re teach specific skills and ideas and provides a reduced student-teacher magnitude relation. Fifth one is home-based tutoring within which the learner is treated reception level by adult learners or oldsters (Topping, 1996). Moreover, many benefits have been evaluated from the peer tutoring, the inspiration to study, advancement in average grades; in accumulation to the others values like socialization skills as enlightening academic performance (Duran, 2004).

Academic benefits of the peer tutoring are healthy participation of students, their problem-solving method, facilitation of others pupils and giving feedback to others students in their work to minimize the anxiety among the students (Topping, 1996). Tong (2004) also explained that achievement in performance can be increased by this method of teaching, and the overall assessment can be taken out easily. They also concluded that tutors are likely to experienced one and they are helpful to take the assessment process during peer tutoring. The tutors go to explain the ideas, concepts and other content knowledge in detail or deep sense to the tutee during learning time in classroom.

Topping (1996) suggests that peer tutoring merely prepared and enhanced the mental attention, cognition and motivational skills of tutors during the work. It is also viewed that Peer

tutoring is also used to increase the other skills of the tutee or learners. Schleyer et al. (2005) examined that the results of peer tutoring generate the ability of problem solving, managing of tasks and minimizing the staff deficiencies among tutors. Additionally, Saenz et al. (2005) examined the influence of Peer-Assisted Learning Strategies (PALS) study which was taken on the Spanish students in reading abilities having learning disabilities (L.D) also.

According to the Rizve (2012), children are performing better in their zone of proximal development by peer tutoring method from the students who are still treated in traditional methods of studies like lecture method etc. Like, Moreneo and Duran (2002) viewed that it is a cooperative learning among the students which polishes their mind and generates new concepts of thinking because we believed that the tutor and tutee don't equal academic ability but they share a typical information, goals and tasks to one another. Yusuf (2004) pointed out that this goal must be achieved through a relationship framework organized by the teacher to advance the child cognitive development. Peer tutoring is considered as a powerful source of change of behavior of learners.

Fuchs et al. (2002) argued that peer tutoring participates in the character improvement, upgrading and enhancement of schoolchildren during their socialization, learning class room condition, and interaction. Peer tutoring was discovered to be useful in interaction and association experience because the degree of cooperation among students both inside and outside the study room improved fundamentally. Considering the above-mentioned background, there's sufficient proof in literature about the usefulness of peer tutoring at secondary level especially in teaching the various subjects in enhancing the students' performance or learning outcomes in any respect educational level.

It can, thus, be concluded that together with other school facilities, promoting the culture of peer tutoring is additionally essential for enhancement of students' learning outcome. As mentioned earlier, the past several years has witnessed an ascent of technology and its use in education. A touch effort has been made to extend the standard of education. Similarly, usefulness of peer tutoring has not much been studied from the angle of students' performance at secondary level (Vygotsky, 1987).

Nicholas (2021) also reported that children having high literacy rate have a great influence on the achievement of others students in the class room environment. It's believed that through impersonation, ones conduct and cognizance are impacted. Some problems facing by teachers moreover as educational department may also be overcome by this strategy also like restriction of teachers and infrequent financial assets will be overcome by peer tutoring, i.e., appointment and engagement of volunteers and deep-rooted experienced students. Furthermore, due to its participatory tactic, peer tutoring may additionally help in controlling and regulating the drop-out of the low achiever students to a greater extent (Topping, 1996). Like so on, Peer tutoring has been shown to end in improved transferable skills and better degree assessment outcome (Topping et al., 1997).

2. Research Hypotheses

Following three hypotheses were formulated to test the main objectives of the study.

1. There is no significant difference between the overall mean score of experimental and control group with respect to pretest.
2. There is no significant difference between the overall mean score of experimental groups with respect to pretest and posttest.
3. There is no significant difference between the overall mean score of control group with respect to pretest and posttest.
4. There is no significant difference between the overall mean score of experimental groups with respect to pretest and posttest.

3. Method and Procedure

3.1 Study Design, Population and Sample

The research used a quasi-experimental approach with a pre-test and post-test. According to Cresswell (2012), the results of this investigation proved the connection between the two previously unknown factors. Two groups, one intact and one pretexting, were selected in this design. Due to the impossibility of randomly assigning participants to experimental groups and the fact that educators often use whole institutions (universities, school districts, etc.) when doing research, quasi-experimental designs became more popular. All the High schools having secondary classes were the population of the study and study was conducted at the Govt. High School khan Pur Bagga Sher Tehsil Muzaffargarh only. There were 119 students enrolled in class 9th and 95 students were enrolled in class 10th. The overall population of the secondary portion of the school was 214.

Researcher selected the class 10^{th} as a sample of study and there were 50 students in section "A" and treated as experimental group. The enrollment of section "B" was 45 and treated as control group for study. The school selected in experimental group had two intact / pretexting sections labeled as section A and section B. Students of Section "A" was selected as experimental group and the students of section "B" was selected as control group. The standard form of teaching was used with the control group, whereas the peer tutoring model was used with the experimental group.

3.2 Tool Development and Validation

In this research, a chemistry exam taken by students in 10th grade was utilized to compile data. In order to evaluate the students' progress in chemistry, the researcher created a pre- and post-test that he or she individually developed in accordance with the standards of the already-taught tenth-grade curriculum. The pre-test was developed consistent with prescribed and standard pattern of Board of intermediate and secondary education Dera Ghazi Khan. The test containing 60 marks was divided into three parts i.e., 12 marks for objective, 30 marks of short questions and 18 marks of long answered questions.

The pretest was developed consisted of first four chapters of chemistry as well as from the exercise of these chapters which had already taught to students by school's teachers. The pretest was prepared having sixty marks containing the MCQs, Short answers questions and Open-ended long questions. The distribution of marks was allocated according to the scheme of Board of Intermediate and Secondary Education and twelve multiple choice questions (MCQs) were selected from these four chapters and exercise, each having the one marks and over all twelve marks were given to the MCQs. The next section of the test was subjective type test consisted on the four questions; from question number two to four were short questions having 10 marks of each section, overall, 30 marks were given to this section.

More ever, from question number five to seven were long questions, pertaining to eighteen marks with the choice of one question. Here, the students have a choice to attempt any two questions. The sample of test is attached in Annexure "A". The following table is indicating the marks distribution of pretest and posttest question paper which was prepared from first four chapter of tenth class in chemistry subject for experiment on the basis of recommended board pattern.

The content of chapters and exercise of these chapters were used according to the level of the students to develop the research tool. The content selection was used in pretest was meaningful, easy to understand able and stem of questions were justifying and simple. To ensure reliability in terms of content, format, and cognitive level, researchers utilized the identical exam for both the pre- and post-tests. A test draught was created based on the input of three specialists. There was some preliminary testing done at the Government High School in Muradabad. Participants in the pilot testing are asked for their opinions on the test's usefulness, item structure, reliability, and completion time, among other things. Additionally,

a test was completed in accordance with the alterations proposed by the expert panel and the participants of the pilot testing.

Reliability was detected or perceived as the degree to which a test was free from estimation for mistakes, since the more estimation blunders happen the less tried and true the test would be (Fraenkel & Wallen, 2003; Schumacher & Mcmillan, 2006; Moss, 1994). Reliability of the calculating of results and their consistency could be checked out by IBM, SPSS statistics software and the appropriate alpha value was decided to increase the reliability and the value of Cronbach Alpha was found 0.8.

3.3 Tool Administration and Data Collection

After obtaining the necessary approval from school administration, two sections of 10th graders at Govt. High School Khan Pur Bagga Sher in Muzaffargarh participated in this Quasi Experimental pre-test post-test design of research. Student samples from both groups (A and B) were given a pre-test and their results analysed before the experiment was run. The purpose of the pre-test was to gauge the students' knowledge of the chemical material covered thus far in the course. After calculating the test results, it was observed that the two groups' pre-experiment means were quite similar.

The researcher used a peer tutoring methodology to instruct the experimental group, while the instructors at the schools as usual instructed the control group. Each session of the peer tutoring approach had its own lesson plan. In addition, the school's expert and administration had reviewed and sanctioned all lessons. After eight weeks, a post-test was administered to both groups to determine the success of the peer tutoring program.

The two equivalent groups were made to analyze the effect of peer tutoring on the academic performance of students at secondary level at Govt. High School khan Pur Bagga Sher Tehsil and District Muzaffargarh. The experimental group belonged to section “A” and control group belonged section “B”. The experiment group was taught by peer tutoring strategy. The control group of study was taught by school teacher, who used the old traditional method for teaching. There was no treatment like peer tutoring was given to the control group i.e., section “B”.

The experimental group was divided into two sub groups like tutor and tutee. The proper division of teaching sessions was scheduled to teach them by peer tutoring technique. The study period for experiment was eight weeks. The proper lesson planning for each week was made and every week consisted of the selection of topics from the text book of subject chemistry for class 10^{th}. The course contents were divided according to time allotted for study and duration of lesson. The main students learning outcomes were made according to text book criteria and scheme of study provided by the board based on the standard pattern.

During the experiment, the tutors are advised to teach, help and assist their other group’s members so that learning as well as teaching was made in friendly and peace full environment. During the session, the overall academic activities were examined like their group discussions, their activities, their participations and completion time of any assigned task during the peer tutoring process. If any group was facing any problem or difficulty in their studies, then, their problems were solved and appreciated them in their achievement. All groups belonging to the experiment were examined carefully and monitored properly. A proper time was given to them for group discussion and questions answer session.

At the end of every week, a discussion session was also conducted to review the summary or achievements about the lesson. So on, eight week scheduled were conducted properly and contents’ of subject as well as exercise of the chapters were taught by peer tutoring method and in the last week a revision was made for the preparation of posttest. Now, it was observed that not only tutors but tutees have a capacity to get through the posttest or perform better because they got maximum knowledge by their group members as well tutors through peer tutoring.

The control group was taught by already allotted school teachers and they delivered their contents by traditional and lecture method as well. There was no any grouping of students like tutors and tutees for learning process. No problem solving technique was used; this group was only limited to the old or traditional method of study. Here, it was also observed that students were facing problems in their concept clarity as well as content knowledge.

After completing the eight-week duration of study, a posttest was conducted. The experimental and control groups were taken a participant. Their posttest feedback was collected by marking their paper as per rubrics. The obtained scores were arranged according to the students and the overall testing of hypotheses were made by analysis of data through special software program like SPSS.

3.4 Data Analysis and Results

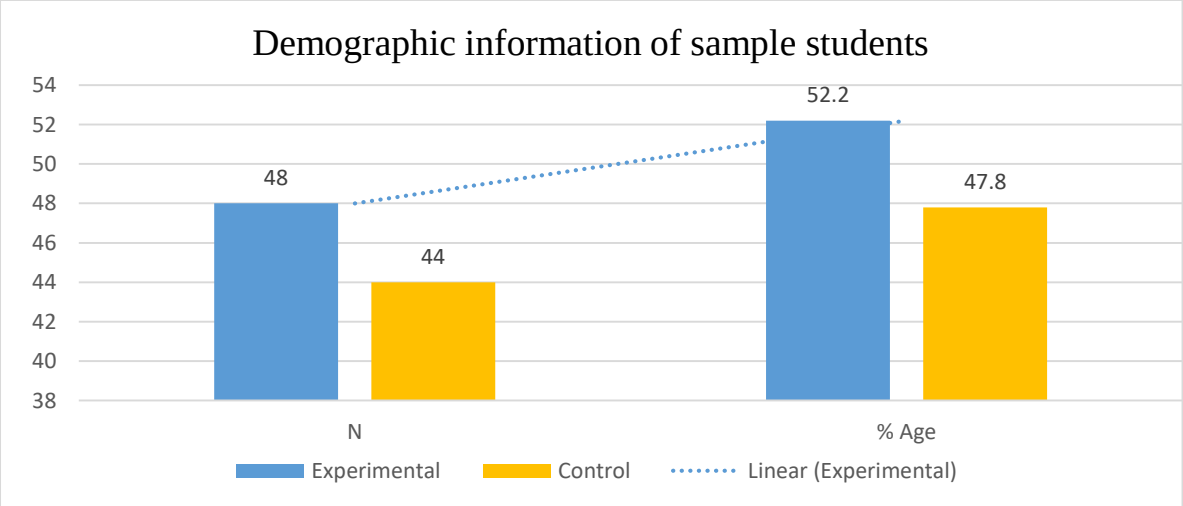
The purpose of the study was to determine the impact of peer tutoring on secondary school students' performance in Chemistry. The research was carried out at Govt. High School khan Pur Bagga Sher Tehsil and District Muzaffargarh. Table 4.1 displays the demographic data of the study's participants.

Table 1: Demographic information of sample students

Grade	Subject	Gender	Age	Group	N	% Age
10th	Chemistry	Male	14-18 Year	Experimental	48	52.2 %
				Control	44	47.8 %
				Total	92	100 %

Table 1 shows that the study was conducted at grade tenth students who were studying the subject chemistry. The age range of the students was 14-18 years; there were 48 students in section “A” who were labeled as experimental group and 44 students were enrolled in section “B” was taken as control group. The experiment group was 52.2% and control group was 47.8 % of the sample of study. 92 students were taken for the sample of study. From Table 1, it was concluded that percentage (52.2%) of the experimental group was larger than the control group and also depicted in Figure 1.

Figure 1: Demographic information of sample students



H_o1: There is no significant difference between the overall mean score of experimental and control group with respect to pretest

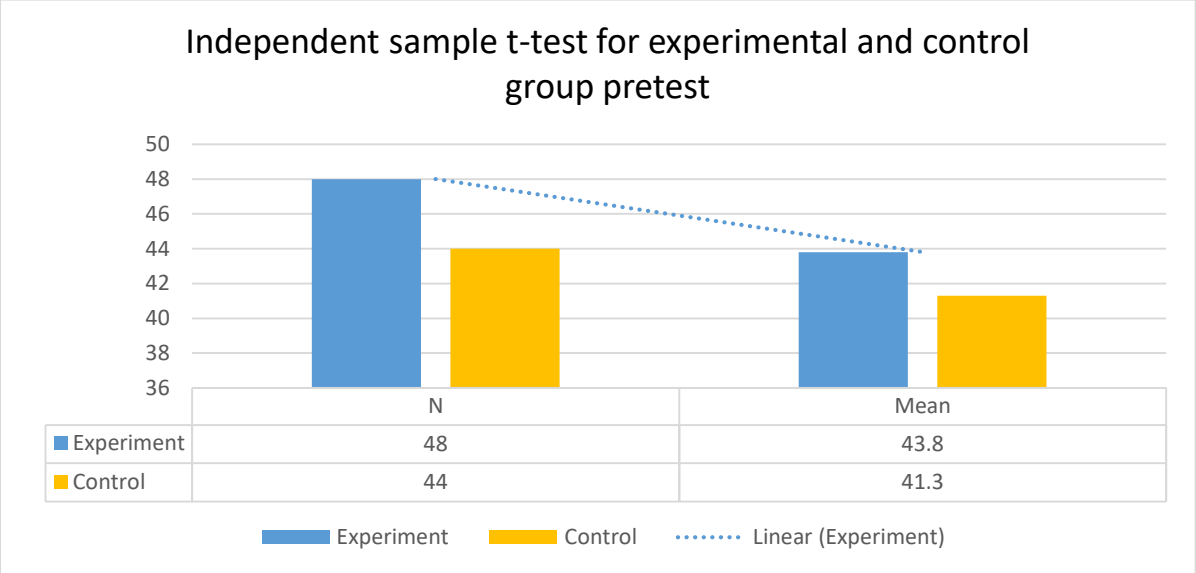
Table 4.2: Independent sample t-test for experimental and control group pretest

Group	N	Mean	Std. Deviation	t	df	Sig
Experiment	48	43.8	7.08	1.85	93	0.98

Control	44	41.3	7.18	1.85	91.6	

Table 2 demonstrates the results of an independent-samples t-test that was applied to match the overall mean score of experimental and control group with respect to pretest. Table 2 also reveals that the p values for overall mean score of experimental and control group with respect to pretest was found 0.98. It describes that the mean of the Experimental group is 43.8 and the Control group is 41.3. More ever, the mean values indicated that both the groups are normally distributed and seemed almost equal. The values of df (Degree of freedom) indicates that there is difference of 1.4. More ever, it is concluded from Table 2 that both groups are near to equal in academic performance in Chemistry in pre-test. It was concluded from Table 1 that the value of Sig. was greater i.e.0.98 than the assigned value 0.05 so the null hypotheses was accepted and same data is reflected in Figure 2.

Figure 2: Independent sample t-test for experimental and control group pretest



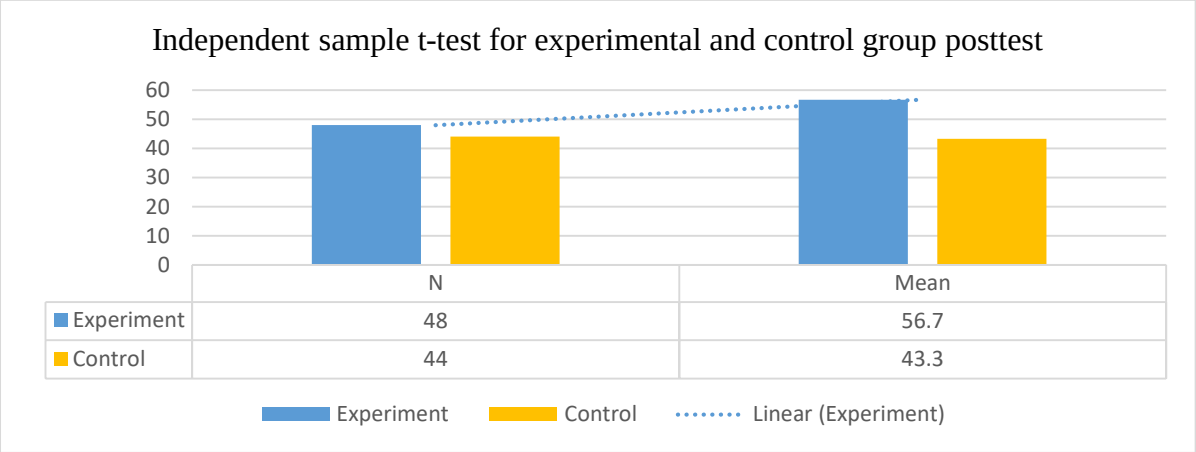
H_o2: There is no significant difference between the mean scores of overall experimental and control group with respect to posttest.

Table 3: Independent sample t-test for experimental and control group posttest

Group	N	Mean	Std. Deviation	t	df	Sig
Experiment	48	56.7	3.96	3.82	93	0.00
Control	44	43.3	8.05	3.70	62.62	

Table 3 displays results of an independent-samples t-test that was applied to compare the overall mean score of experimental and control group with respect to posttest. Table 3 also reveals that the p values for overall mean score of experimental and control group with respect to pretest were greater than .005 i.e. 0.00. It indicates that the mean of the Experimental group is 51.7 and the Control group is 48.3 having the difference 13.4. The values of df (Degree of freedom) indicates that there is difference of 30.38. Table 3 interpreted that the both groups are not equal in academic performance in Chemistry at the end of experiment or after the treatment through peer tutoring method and there is a significance difference in academic achievement at that time. Table 3 has a conclusion that the value of significance level is less than 0.05. From Table 3, it can, thus, be inferred that there is a rejection of null hypothesis and a significance difference is seen in overall performance of experimental and control groups in posttest achievement and also described in Figure 3.

Figure 3: Independent sample t-test for experimental and control group posttest



H_o3: There is no significant difference between the overall mean score of control group with respect to pretest and posttest.

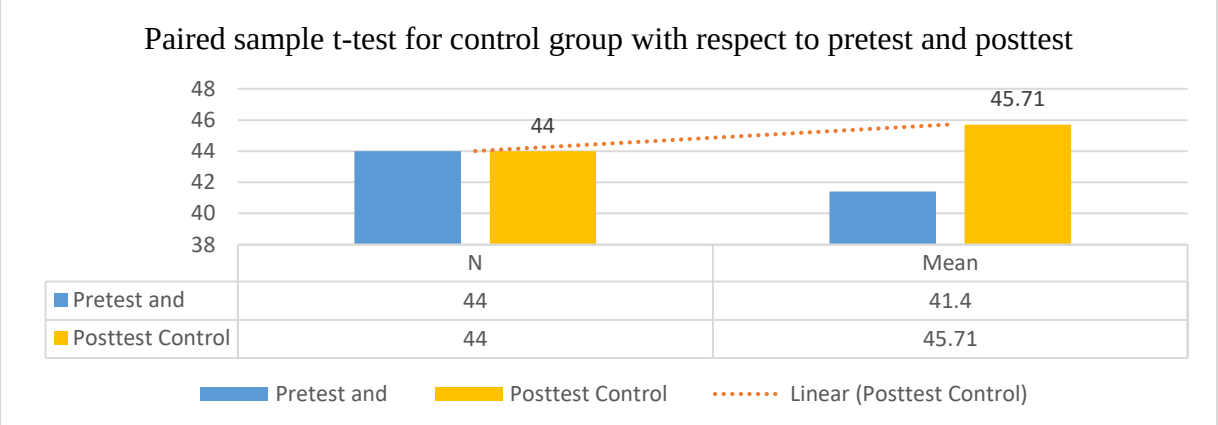
Table 4

Paired sample t-test for control group with respect to pretest and posttest

Group	N	Mean	Std. Deviation	t	df	Sig
Pretest and Posttest Control	44	41.40	7.18	3.39	44	0.00
	44	45.71	9.34			

A paired-samples t-test was used to determine whether or not there was a statistically significant difference between the control group's mean score on the pre- and post-test (see Table 4). There was a light difference in the mean scores for pretest control group (M=41.40, SD=7.18) and post experiment group (M=45.71, SD=9.34) and the standardized value of p is 0.00 (p=0.005). Table 4 also shows that these results recommend that there is a less increase in the academic performance of students in Chemistry of control group as compared to experimental group of samples. Because, our results advocated that when treatment like peer tutoring is not given to the control group, there is also increase in the performance of students of control group. The reason was that control group was not treated with special experimental technique like peer tutoring instead they were given simple lecture or traditional method for teaching. Moreover, from Table 4, it was concluded that the value of p is 0.002 which is less that the assigned value i.e., 0.005, so the hypothesis was rejected because the value of p (0.002) illustrates that there is a significance difference in these two groups with respect to their academic achievement before and after the duration of experiment. Figure 4 also illustrated the same data as given in the Table 4.

Figure 4: Paired sample t-test for control group with respect to pretest and posttest



H_o4: There is no significant difference between the overall mean score of experimental groups with respect to pretest and posttest.

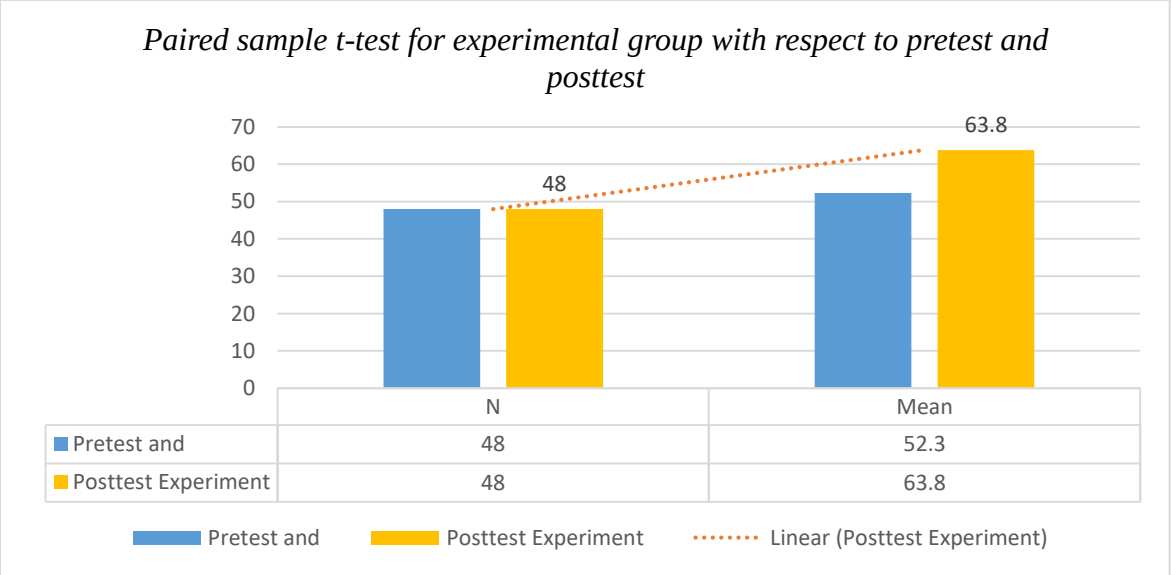
Table 5

Paired sample t-test for experimental group with respect to pretest and posttest

Group	N	Mean	Std. Deviation	t	df	Sig
Pretest and Posttest Experiment	48	52.3	7.09	6.3	49	0.00
	48	63.8	3.94			

Data from a paired-samples t-test are shown in Table 5 to show whether or not there was a statistically significant change in the mean score of the experimental group between the pre- and post-test administrations. There was a significant difference in the scores for pretest experiment group (M=52.3, SD=7.09) and post experiment group (M=63.8, SD=3.94) and the standardized value of p is 0.005 (p=0.005). These results recommend that there is an increase in the academic performance of students in Chemistry. Specifically, our results advocate that when treatment like peer tutoring is given to the experimental group, there is utmost increase in their performance. More ever, from Table 5, can also conclude that the value of p is 0.00 which is greater that the assigned value i.e., 0.005, so the hypothesis is rejected because the value of p (0.00) illustrates that there is a significance difference in these two groups with respect to their academic achievement. Figure 5 having the same results as shown in Table 5.

Figure 5: Paired sample t-test for experimental group with respect to pretest and posttest



4. Discussion

The major objective of this study, which was conducted using a quasi-experimental pre-test post-test methodology, was, as a result, to evaluate the influence that peer tutoring has on the academic performance of secondary school students in the subject of chemistry. The study also attempted to compare the outcomes of students who were taught chemistry via the use of more conventional means of education versus those who were taught the subject through the medium of peer tutoring.

A representative sample of 6998 male students attending high schools and higher secondary institutions in the Tehsil of Muzaffargarh was collected for this study. In spite of this, for the sake of this investigation, two whole, already-established 10th grade classes from Government High School Khan Pur Bagga Sher were selected. A session of peer tutoring was conducted with a class of fifty students, who were referred to as the "Experimental group." During that time, 45 more youngsters were part of a "control group" that received instruction

using more conventional methods. A before and after comparison test approach was used in the gathering of the information. For the purpose of analyzing the data, SPSS was used, and descriptive analysis techniques, including the independent t-test and the paired sampling test, were utilized for validation purposes.

Before beginning treatment in the form of a peer tutoring method, it was discovered that the average scores achieved by both groups were relatively comparable to one another. Inferential statistics revealed, to the positive, that previous to receiving treatment, students in both groups were doing academically in a manner that was comparable (Cresswell, 2012). In contrast, the inferential statistical findings of post-test data revealed that students in the experimental group who were taught using the peer tutoring approach had significantly higher levels of academic accomplishment than students in the control group. This was the result of the experimental group students being taught using the peer tutoring approach (Egger, 1995; Sadovi, 2008). In addition, several of the null hypotheses, such the one that said "There is no significant difference between the mean scores of overall experimental and control groups with reference to posttest," were not supported by the data. Considering that the p-value is lower than the one that was estimated. According to the findings, students' academic performance in chemistry at the secondary level might improve from receiving assistance from their classmates.

In addition, the findings of investigations conducted by other researchers have shown results that are similar (Ali et al., 2015). According to findings from research carried out by Ali et al. (2015), having a fellow student act as a tutor is beneficial to pupils. The reading effect was also studied in the research that was conducted by Kaleem et al. (2018), which came to the same conclusion as the previous study in that it discovered that peer tutoring had a substantial impact on students' academic progress. When it comes to reading, the contact between tutors and the pupils they teach in secondary school might potentially assist both parties develop their abilities (Hagen & Hennemann, 2019).

In conclusion, it was shown that students' performance in chemistry improved after getting treatment that was analogous to the model of peer tutoring. [Citation needed] The study placed a strong focus on students using their classmates as tutors because of the positive benefits that doing so had on the students' grades and general academic performance (Maheady et al., 2001) In a similar vein, the findings of this study have significant implications for teachers, principals, and politicians who are interested in improving the performance of students taking chemistry exams.

5. Conclusions and Recommendations

Statistical data analysis of findings concluded as the performance rate of both control and experiment groups were not equivalent so there was significance different in their performance. The pretest scores of experiment and control groups showed that there is a no much significance difference in the academic performance of students in chemistry. The posttest scores of the experiment groups provided the evidence that the academic performance of the students in chemistry subject increased positively. Learning through peer tutoring showed the better results in final posttest than the traditional method used to control group of study. The study recommends the following strategies should be used during the academic activities of high schools especially in the teaching of science subjects like chemistry.

The higher authorities and educational administrators should pay a special attention on the peer tutoring during the preparation of lesson planning. The educational institutions that are responsible for the CPD (Continuous Professional Development) training courses for the improvement of pedagogy of teaching staff should make ensure that the peer tutoring strategy should be included in their training manual. For the improvement of generic skills of students, the teacher should deliver a positive discussion and play a key model role before the class that expose the peer tutoring strategy as a supplementary and supporting method of teaching or

delivering the content to the class. The educational seminars, workshop, conferences and feedback sessions should be arranged to promote the peer tutoring strategy for teaching in the classroom for the betterment of results. Here, it is also seen that the peer tutoring is a good way of teaching in which any activity should be given to the students and monitor directly and easily by the teachers. It should be taken in implementation at public, private and any other educational institutions to get the more favorable results at secondary level.

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