

## **Effectiveness of Peer Tutoring on the Mathematics Performance of Slow Learners**

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### **Abstract**

The evidences and generalizations of the preceding literature have assured that no solitary study has been conducted on the effect of Peer Tutoring on Performance of Slow Learners in Southern Punjab, Pakistan yet. The proposed study aimed at revealing the marvelous secrets about the “Effect of Peer Tutoring on Slow Learner’s Performance.” Experimental design was opted to

accomplish the study. A sample of 40 students was taken from Govt. Institute for Slow Learners, Layyah. A Self Designed Test was used to gauge the performance of slow learners in mathematics after implementing intervention plan. Statistical analysis entailed pretest and post-test findings and inculcations were analyzed by using Paired Sample T test. The inferences that SPSS exposed were significant. In a nutshell, numerical results evinced the hypotheses of proposed study. The value of p in Paired Sample T test which was ( $p=.000$ ) claimed that there was notable difference in mathematics performance of experimental group after undergoing in peer tutoring session. To explore the gender disparity on the level of performance an independent t test was applied. The significant value ( $p=0.001$ ) depicted by independent t test further armored the second hypothesis, 'there may be gender difference in performance of mathematics after being exposed to peer tutoring'. The study and its empirical authentications prompted the educators to used peer tutoring as an effective teaching strategy and assisted psychologists to implement peer tutoring as a therapeutic intervention to augment the learning abilities of the slow learner students.

**Keywords:** Peer Tutoring, Mathematics performance, Slow learners, Southern Punjab, Education, Psychology, Learning

## **Introduction**

A slow learner child has below average intelligence. The slow learner students have an IQ of 70 to 85. They have delayed developmental milestones. A slow learner is not a diagnostic category. Burt (1937) titled the slow learner students as backward children which cannot accomplish their task normally.

Kirk (1962) recognized slow learners on the basis of rate of learner. He termed slow learner as average and gifted children on the verge of rate of learning. He made a clear distinction between slow learner children and mentally retarded students. He argued that slow learner could show moderate educational progress than normal child. A slow learner adult can manage life dealings himself without any assistance. Slow learners as a broad generic term. Slow learners are categorized in three groups. The slow learner with neurological causes suffers from aphasia and has reading, writing, and recognition difficulties. (Tansley and Guilford 1962)

According to the research of Curtis, K. and Shaver, J.P. (1980) slow learners have very short attention span. Owing to shorter attention and concentration span, the slow learners are unable to focus on verbal instructions of the teacher for longer time. They need short and frequent lessons for better perceptions. Jenson (1980) labeled the student as dull normal who have lower than 80-90 IQ and generally they are slower to grasp abstract and conceptual students.

Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller (2003) defined Peer tutoring is a systematic; peer mediated teaching strategy in which students are paired with other students for the purpose of better learning. In content context at the diverse level of abilities, peer tutoring capable the teachers to uplift learning and academic goals of learners. (Cohen, Kulik & Kulik, 1982; Cook, Scruggs, Mastropieri, & Casto, 1985; Johnson, Maruyama, Nelson & Skon, 1981). According to Mastropieri, M., Scruggs, T., Mohler, L., Beranek, M., Spencer, V., Boon, R.T., Talbott, E. (2001) peer tutoring as an instructional strategy to accomplish academic goals in the classroom. Ryan & Deci (2000) stated that it is a teaching process in which a student teaches other students by pairing up in the group. Peer tutoring is defined by Scruggs, Mastropieri and Marshak (2012) as an instructional strategy to accomplish academic goals in the classroom.

Schloss, Schloss, and Schloss, (2007) deciphered peer tutoring a strategy of playing a teaching agent for their peers. Peer tutoring is an accelerator in mathematics achievements of the students (Fuchs, Fuchs and Karns 2001). Roscoe and Chi (2007) ended up their study by revealing the fact that tutors seek new knowledge by using their previous knowledge. Students uplift themselves and widen their academic pool by working together in peer form (Schacter 2000). For the elementary students, peer tutoring is an effective intervention in urban and poor socioeconomic eras (Rohrbeck et al. 2003).

Topping (2008) elaborated blessings of peer tutoring that are higher academic achievement, improved peer relationship, improvement in personal and social development and enhanced motivation. Peer tutoring if applied with effective tutor training can enhance students 'academic learning.

As the slow learner definition manifested that they have poor cognitive skills and could not focus on multi step instructions. In Pakistan, the curriculum of slow learner is similar to the curriculum of general education. It is very difficult to teach the general curriculum to the slow learner child in the limited time. The teacher of the slow learner has a tough job to include the slow learner

into mainstream classes. In this case, these children not only pose a problem for themselves but also can be a burden on their parents and teachers.

Asaf Nawaz, Zahoor Ur Rehman (2017) studied the peer tutoring effectiveness on students at secondary level. In their study they examined the effects of peer tutoring in the mathematics. A population of 200 students was chosen from two different schools. The students were partitioned into two groups: experimental group and control group. As per designed study, pretest conducted then peer tutoring session was taken. After termination of peer tutoring strategy the changes in performance of mathematics of students were analyzed. The findings of the research also evinced that girls scored high after being exposed to peer tutoring than boys of experimental group.

Another study emphasized importance of peer tutoring as booster of academic success. In their research the researcher conducted study with the moderating effect of gender. Experimental mode of research design was used by them and sample was taken from the secondary schools. Two groups were treatment group and control group were undertaken in the study. Economic performance test consisting of 50 items of multiple choice objective tests was applied to the students to measure academic performance. They revealed in their study that students in the peer tutoring group succeeded in the test rather than students in the conventional instruction group. The experiment was not influenced by gender. (Yusuf Abdul Raheem, Hamdallat T. Yusuf, and Adesegun O. Odutayo 2017)

Elizabeth Akinyi Oloo (2016) argued about mathematics in the school curriculum. According to researcher mathematics is perceived as important character for defining career options. But it has been observed that students face difficulties in performing mathematics and portrayed poor performance. The researcher conducted her study in the secondary education department in order to enhance abilities of students in the subject. The sample was drawn from 12 schools randomly. The purpose of study was to examine the effect of peer tutoring among students in the mathematics. She selected population from heads of department, teachers and students of mathematics. She used descriptive survey in her study. Data was collected and analyzed through statically procedure. The inculcations were depicted the positive results of the study and heads assured that peer tutoring definitely an assistive approach in the academic life of the students.

Costantini, (2015) defined peer tutoring as an influential intervention in all parts of the content knowledge. Peer tutoring, according to him, is also an enhancer of student understanding of subject matter. He argued about class wide peer tutoring that is fruitful in student's grade improvement and widen the student's involvement in the content knowledge. He also depicted the social and behavioral importance of the peer tutoring.

In his study, Bowman-Perrott, et.al (2013) elaborated their previous study in the peer tutoring. They argued that the peer tutoring plan is the major source of gaining educational purposes in the curriculum. The peer tutoring is more fruitful in the students at elementary and secondary level. They further found peer tutoring is the key motivator among students. Topping, Miller, Thurston, McGavock and Conlin (2011) tried to differentiate the effect of peer tutoring between students with low socioeconomic status and students with high socioeconomic status. He inculcated that there is more gains for the slow students than bright students. He further included gender factor in his studies and found that girls are more prone to learn from peer tutoring than boys. They further widened their studies to the social understanding of the students. They argued that the students through peer tutoring can easily share their ideas and problems with peer rather than teacher.

According to Paisey (2010), mathematics is a journey to understand other subjects. Mathematics is a foundation on which other subject's understanding depends. He further stated that mathematics make students logical, rational and analytical in problem solving skills. He also revealed that mathematics helps the students in other conceptual subject's physics and chemistry.

Woolfolk (2010) defined the Piaget's and Vygosky's idea of social interaction that peer-to peer interaction motivates students to study and social interplay causes learning. Siyepu (2013) argued that Vygotsky's concept of the zone of Proximal contributed a great progress on the theoretical ground of peer tutoring. Peer tutoring session assists the peers to larger extent in order to sort out trouble solving puzzles. It creates a progressive setting for the peer to enhance their potential.

Kunsch and colleagues reported moderate improvements were observed in mathematics performance who took part in peer tutoring session than those who were not participated in peer tutoring ( Kunsch et al. 2007). Kroeger and Kouche (2006) worked on peer assisted learning strategy on the mathematics students of seventh grade. He concluded that practice of peer

tutoring regularly works as an assistive policy to solve arithmetic problems. He further elaborated that peer assisted learning strategy is an ironic supplement and nutrition to the students weak aspects of the subject matter. According to them, this activity keeps the student in the learning and practice of the mathematics and identifies the weakness of the students.

The subsequent literature depicted that there has been no study conducted on effect of peer tutoring on slow learner population in southern Punjab. The antecedent researches were conducted on the effect of peer tutoring in general education population, on disabled students, in medical colleges and in education universities. So, the motive behind the study is to introduce the blessings of peer tutoring in educational atmosphere of slow learner students. In addition, the intentions of the researcher are to evaluate the effect of peer tutoring in mathematics of the slow learner students.

The inferences of the research may assist the special education teachers, parents, learners, and curriculum developers. The analysis of previous studies has proved that peer tutoring is the effective intervention in the area of learning. Peer tutoring is not only beneficial for the students but also for the teachers.

In addition to academic advantages, peer tutoring may improve peer relationship, personal and social development, and cognitive skills like leadership skills, decision making skills and planning. Peer tutoring also reveals comfort and openness of the students and may help to reduce anxiety. Peer tutoring may uplift confidence, enhance interest and motivation of the students, and also develop effective communication among peers.

Pakistan has been facing crisis of primary education since independence. Pakistan's literacy rate is still 57% due to poor quality of education. Lack of proper trained teacher, lack of material accommodations and social restrictions are the chief hurdles in better education of students at primary level. A teacher is teaching more than 50 students in the class without assistant. It is very difficult for the teacher to show better performance and results of each student in the class. In the matter of slow learner children, a special teacher cannot rely on only teaching method. He has to use different effective teaching strategies and intervention plan in order to overcome learning difficulties of the slow learner children.

## **Objectives of the Study**

- To determine the effect of peer tutoring on academic performance of the slow learner students.
- To analyze the boosting effect of peer tutoring on learning of slow learner children in mathematics.
- To evaluate the effect of peer tutoring on performance of slow learner children on gender basis.
- To advocate a method of peer tutoring as an effective strategy in order to enhance academic performance of the students of slow learner.

## **Hypotheses**

H1: There may be a considerable difference in pretest-posttest mathematics achievement level of slow learner students who expose to peer tutoring session.

H2: Whether the slow learner students under peer tutoring intervention may score high in mathematics than those students who don't get peer tutoring intervention.

H3: Whether there is a significant gender disparity in performance of boys and girls who expose to peer treatment.

## **Method**

The proposed study was to determine the effects of peer tutoring strategy in mathematics performance of slow learner students of 5<sup>th</sup> grade. The research design was quasi-experimental design. Two groups were participated in the study. Group A, the experimental group was exposed to a peer tutoring session during mathematics lecture. Group B, the control group, was given general guided instructions during lecture. The students of both groups were pre-tested and post-tested. A self-devised test of mathematics was engineered by the teachers of REAL MATH (unit test). The researcher has used pilot study and test retest reliability in order to gauge the reliability of the designed test.

### **Sample:**

The population was selected from Govt. Institute for Slow Learners, Layyah under Department of Special Education Punjab. The population consisted in 40 students of fifth class of slow learners. The experimental group consisting 20 students from fifth grade has been taken under treatment in peer tutoring strategies whereas the control group consisting 20 students remained intact from peer tutoring treatment. Each group has 10 girls and 10 boys as well. Simple random sampling has been considered in order to conduct study.

### **Tutor Training Session**

Then subjects of experimental group were introduced to peer tutoring intervention plan. Experimental group was divided into four groups comprising five students. Each group contained one tutor and four tutees. The psychologist trained the four tutors for peer tutoring in forty five sessions during first week. So, each of the four treatment groups, every tutor was guided by psychologist how to perform peer tutoring in class. In the training session, tutors were provided all helping stuff and effective tricks and tutoring procedures in order to facilitate their anticipated intervention plan. In the end of session, a feedback was taken from all tutors in order to evaluate their readiness and expertise.

### **Peer Tutoring Session:**

The implementation of the peer tutoring session commenced on the very first day of second week as planned by the researcher. Each tutor assigned to assist his tutees in mathematics activity in defined time (45 minutes each day). Peer tutoring session continued to the end of second week. Peer tutoring session was observed by the researcher both overtly and covertly.

### **Instrumentation:**

A self-engineered Simple Addition, Subtraction, Multiplication and Division Test as pre-test and as post-test was constructed by the researcher, composing 20 test items. A self-devised test of mathematics ability was applied in the study. The self-devised tool consisted of 20 items of different mathematics questions of unit math. The tool was engineered by the senior mathematics



experts of the different schools. The questions were taken from the textbook of grade 5. The test items were included according to the mental abilities of slow learner students.

For the purpose of feasibility of study, the researcher conducted a pilot study. Another Govt. institute for slow learner was selected for pilot study because it underlined all the similar features as study school. A sample of 10 students' constituting of 5 boys and 5 girls of 5<sup>th</sup> class was extracted. They were subjected to the self-designed test of mathematics. The motive behind the study was to refine the self-devised tool. Owing to maintain validity and clarity of all items of the self-devised tool and elimination of ambiguities in the tool, pilot study was implemented. The selected school was not considered in the main study. Pilot study method was same as main experimental method was applied. Hence, findings of the pilot study were analyzed using the Pearson Formula. The value of  $r$  was 0.71 which witnessed about reliability of the instrument.

According to Mugenda and Mugenda (2003), reliability is a measure of the degree to what extent a research instrument yields consistent result or data after repeated trials. An instrument is reliable when it measures a variable correctly and obtains the same results under same conditions over a period of time. To ensure further the reliability of the self engineered test, pretest was conducted on the population of 10 students for two times from the Govt. Institute for Slow Learners Lodhran, Bahawalpur. The findings were calculated through using Pearson formula. The calculated value of the test was 0.74 which stamped the reliability of the test.

### **Procedure:**

The subjects were heterogeneously group for proper implementation of peer tutoring program. Subjects were paired according to the students file information and teacher recommendations after being assessed by the psychologist. Pre-test of mathematics was conducted in the first week and findings of the test were analyzed in the end after terminating the phase of posttest.

The total time for the study planned as 3 weeks, schedule as follows:

Week one: Pretest and Training period of peer tutoring

Week two: Implementation of peer tutoring intervention on experimental group

Week three: Posttest and analysis of the inculcations

**Results**

All data coding and analysis was formulated through SPSS and descriptive statistics method was used for the interpretation of results. However, paired sample t test was used to analyze the difference of performance of experimental and control group. T test was used to analyze the difference between boys' and girls' performance in the test.

**Table No. 1**

*Results of t test and descriptive statistics of pretest and posttest performance of experimental group.*

Variable	M	N	S D	SEM	p
Pair 1 Pre intervention score	9.6250	20	2.59869	.41089	.01
Post intervention score	12.1500	20	3.10954	.49166	

There was a significant difference in the scores of subjects of experimental group in pre intervention score (M= 9.6, SD=2.5) and post intervention score (M=12.1, SD=3.1)with the value of p (p=0.01). Therefore, the numerical calculations approved first hypothesis that there is significant difference in performance of students who were exposed to peer tutoring intervention.

**Table No. 2**

*Descriptive statistics and paired sample t test results of post intervention of experimental group*

Pretest	Posttest		95%CI for Mean			r	t	df	
	M	SD	M	SD	n				
<b>Experimental</b>	9.62	2.59	12.15	3.10	20	-3.53, -1.5	0.00	-5.0	39

*Group scores*

*R Squared = .000 (Adjusted R Squared = .000).* These values proved there was significant difference of results in experimental group after being exposed to peer interventions

The results in table no.2 shows that there was a significant difference in the scores of subjects of experimental group in pre intervention score (M=9.62, SD=3.14) and post intervention score

( $M=12.15$ ,  $SD=3.10$ ) conditions,  $t(39) = -5.07$ ,  $p= 0.000$ . The  $p$  value proved that second hypothesis that scores of experimental group are high than control group.

**Table No. 3**

*Comparing boys' and girls' performance of experimental group in post intervention test*

	N	M	SD	T	P
Girls	10	27.94	5.07	7.30	0.001
Boys	10	18.98	4.56		

$P<0.05$

Table 3 deciphered about means, standard deviation,  $t$  value and  $p$  value. For girls of experimental group,  $N= 10$ , ( $M=27.9$ ,  $SD= 5.0$ ), and for the boys of experimental group,  $N=10$  the mean and standard deviation ( $M=18.9$ ,  $SD=4.56$ ). While  $t$  value of experimental group is ( $t=7.30$ ) and  $p$  outburst by analysis is  $p=0.001<0.05$ . Therefore, the numerical values of independent  $t$  test approved second hypothesis that gender has significant effect on effect of peer tutoring in mathematics.

### **Discussion:**

The present study held to analyze the effect of peer tutoring in mathematics performance of slow learner students. Independent variable was peer tutoring and dependent variable was mathematics performance of slow learner students.

For the purpose of study, a quasi experimental design was considered in the research. The sample divided into two subgroups: treatment group and control group. A self devised tool was used to evaluate mathematics performance. For analyzing the performance difference, pretest and post test was used. Treatment group was exposed to peer tutoring session remaining intact control group. The data was analyzed by SPSS. Independent  $t$  test and correlation coefficient, Paired Sample  $t$  test, and independent  $t$  test were applied to take account of the hypotheses of the study.

T test was used to evaluate only the difference of performance after peer intervention implementation of experimental groups. Positive correlation value (0.4) revealed about the obvious relationship between peer tutoring and performance in mathematics. The value of p which was .01 witnessed the difference of performance after intervention of subjects of experimental groups.

Paired sample t test was used to evaluate only the difference of performance before and after peer intervention implementation of experimental groups. The value of p which was .000( $p=0.000 < p=0.05$ ) witnessed the difference of performance after intervention of subjects of experimental groups. In this test the value of  $p=0.000$  further evidenced the obvious disparity of mathematical performance of slow learner students who exposed to peer tutoring and first hypothesis was accepted. The findings were also in congruence with the discovery of Elizabeth Akinyi Oloo (2016) as she argued about mathematics in the school curriculum. According to the researcher's conclusion peer tutoring enhanced the mathematical performance of the students.

The inculcations of the study were also aligned to other study reported moderate improvements were observed in mathematics performance who took part in peer tutoring session than those who were not participated in peer tutoring (Kunsch and colleagues, 2007)

Kiburis (2012) also analyzed that the score of posttest is higher in students with peer assisted learning. In addition to academic gains, the students gain a chance to be in collaboration with other students in order to practice mathematics problems. The held study was also in line with previous research inferences that students implemented by peer tutoring intervention scored high than other students. (Lo and Cartledge, 2004).

Furthermore, pretest and post test score distinction was congruent with the Topping, Campbell, Douglas and Smith, (2003) as cited by Austin, (2008) studies that all the learners depicted an obvious improvement in their performance after the implementation of same age and cross age peer tutoring. Topping, et al. (2003) found in his work that peer tutoring not only enhanced achievement level in mathematics but also uplifted the morale and confidence of both tutor and tutee.

Besides numerical value evidences, Vygotsky theoretical utterances also supported first hypothesis that peer tutoring enhances learning of students. Vygotsky introduced that peer tutoring as a remedy to learning problem. In addition to theoretical backup, the antecedent

studies which were included in literature witnessed about the approved findings of the first hypothesis.

Independent t test was considered to analyze the gender difference in mathematics performance in post peer tutoring intervention. The t value ( $t=0.001$ ) in the test emancipated that there was significant difference in scores of mathematics in posttest intervention of boys and girls. The mean and standard value difference of boys and girls also proved that girls who exposed to peer tutoring intervention scored high than boys. The outcome of the t test was also in consonance with the subsequent study which was done up by Asaf Nawaz, Zahoor Ur Rehman (2017) on peer tutoring effectiveness on students at secondary level. In their study they examined the effects of peer tutoring in the mathematics. They conducted experimental study and conducted pretest posttest procedure. They proved with their numerical values that girls were high scorers in mathematical ability test than boys.

Hence, it is admitted that effect of peer tutoring in girls is greater than boys. The results were identical to previous research findings elaborated by Miller, Thurston, McGavock and Conlin (2011) conducted peer tutoring and included gender factor in his studies and found that girls are more prone to learn from peer tutoring than boys.

### **Conclusion**

The departure phase of the study in the shadow of calculated values and figures, the proposed study held significant. It was claimed in the light of the findings that peer tutoring has played the role of enhancer in the mathematics skills. The study explored the boosting effects of peer tutoring through pre and post intervention score differences of experimental group.

As gender has a bipolar end in the world: male and female, so the scores of boys and girls in the pretest and post test phase have shown bipolarity. The high scores of girls in posttest phase revealed the fact that girls learned more from peer tutoring as compared to boys.

In the light of statistical inferences, vast reviews of past studies, and theoretical framework, the study held significant in fulfilling its objectives. In a nutshell, hypotheses of the study were sheltered by the significant results. The study's refined inculcations were compliant with theoretical evidences. Complacency of findings of the study with proposed hypotheses and theoretical background has paved the way for the teachers and psychologist in order apply peer

tutoring as an effective teaching strategy to boon the academic skills of the slow learner students. It has also opened the doors of cooperative learning for the students of slow learners in the subject matter.

### **Limitations of the study**

In present study, the sample was limited and taken only from Layyah district.

The second thing was that only one type of peer tutoring was used in this study.

Peer tutoring applied in order to scrutinize only mathematics performance by setting aside other subjects like Urdu, English, and General Knowledge.

The study was not conducted on students with intellectual disabilities.

Peer tutoring study was conducted in just academic sphere of slow learner by neglecting its social, interpersonal and intrapersonal implications in student's life.

### **Future recommendations:**

Sample can be taken from other institutes of slow learners in Punjab in order to generalize the findings on all population of slow learner.

Peer tutoring intervention was used in academic sphere of students but it revealed the other brighter side of the student's social, communication and cognitive skills. In addition to improving academic performance, it was observed that student's motivation, interest, communication and social cooperation, and confidence was uplifted. Therefore, peer tutoring can be used for the purpose of social and interpersonal development.

Peer tutoring study can be conducted by future analysts on the special children with intellectual disabilities and physical disabilities. Other types of peer tutoring can be considered in the subsequent study by future evaluators. The students can use Peer tutoring to enhance learning in other subjects of curriculum like Urdu and English.

### **Implications of the study:**

Being exposed to peer tutoring intervention, the higher and better performance of the students already manifested the pragmatism of the peer tutoring intervention in the arena of slow learners' academic life. In addition to improved performance in mathematics, it was overtly observed that the slow learner students learned to cooperate with each other and their confidence level was uplifted to larger extent.

In the peer tutoring intervention session, the secret also revealed that the slow learner students learned more quickly than traditional method of teaching. The students asked question without hesitation to their peer fellows as compared to they ask their teacher concerned. The implications of the study not only proved a booster and catalyst for high grades in mathematics of slow learner student but it would, indubitably, assist the educator concerned in order to overwhelming learning difficulties of the slow learner students in mathematics.

The crux about peer tutoring is that it has very influential and pragmatic applications in learner's academic progress and prosperity in Special Education Department. Besides student's academic achievement, peer tutoring can prove assistive strategy for teachers in getting better results of students. As supported by Vygotsky's theoretical arguments, peer tutoring can be applied for social and community development of students. The blessings of peer tutoring intervention, if applied properly and consistently, would axiomatically shower the rays of progress and prosperity in the educational sphere of the struggling students of Special Education Department.

Teachers may apply peer tutoring while teaching in the class. Teachers may devise different methods of peer tutoring in order to overwhelm learning difficulties of the slow learner students. They will be able to identify the most effective mode of peer tutoring method while applying this program. So, briefly, peer tutoring has a good fortune for both the teachers and students.

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