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An Analysis of Students' Leadership Skills in Promoting Collaborative Learning at the Secondary Level

Mian Said Hussain

M. Phil Scholar, Center for Education and Staff Training,
University of Swat, Pakistan

Email: hmainsaid@gmail.com

Dr. Nasir Ahmad

Associate Professor, Center for Education and Staff
Training, University of Swat, Pakistan

Email: nasir_cupi@uswat.edu.pk

Dr. Alam Zeb

Assistant Professor, Center for Education and Staff
Training, University of Swat, Pakistan

Correspondence Author: alamzeb@uswat.edu.pk

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Abstract

The study was conducted to analyze students' leadership skills in promoting collaborative learning at the secondary level. Study's design was pre- and post-tests pre-experimental and 40 students participated in it. A questionnaire on students' leadership and collaborative learning was developed, validated and piloted for collecting data. A pre-test was administered and then intervention on students' leadership was provided. After intervention, a post-test was administered. Data were analysed using a paired sample t-test to measure the difference of means in students' performance on the pre- and post-tests. The paired sample t-test provided large differences between the pre- and post-test mean values. A correlation between the pre- and post-mean values as well as the p-value for leadership skills in the post-test was $p < .0001$ and that of collaborative learning was $p < .001$ which was very small. It concluded that the intervention worked well and with the improvement in leadership skills among students, their collaborative learning attitudes were enhanced. It established that changes were not random but due to the intervention that brought improvement in students' leadership skills, which in turn improved their collaborative learning skills and behaviours. The study recommended structured leadership development training through projects for developing leadership skills among students.

Keywords: Students' Leadership Skills, Collaborative Learning, Secondary Level, Quantitative, Pre-Experimental.



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Introduction

In today's learning environment, leadership skills for students have become one of the key significant components to create a successful group culture for collaborative learning (Chen, 2022). Collaborative learning or an instructional strategy in which students are encouraged to achieve collective objectives, has been proved to bring effective change to the learning outcomes, oral and written skills, and personal social characteristics of students (Gillies 2021). The majority of the 21st century schools focus on fostering the acquisition of competencies including teamwork, leadership, and critical thinking. Students' collaborative roles enhance education and learning. (OECD, 2022).

Leadership among student's means being a peer influencer, a problem-solver and being able to steer a group in the correct direction (Kouzes & Posner, 2023). Studies show that leadership enhances group interactions, increases self-justification and accountability and develops caring and respect in the classroom environment (Smith & Collins, 2021). There is an understanding of the importance of leadership in collaborative settings. However, the empirical research, including the present study is limited to the secondary education level where students are in the developmental stage of leadership competencies (Johnson et al., 2022).

Collaborative learning becomes one of the possible models in which students work cooperatively and assume significant amounts of responsibility both for their own learning and for others' learning based on the problems of traditional teacher-centered processes of education (Vygotsky, 1978; Jones, 2023). Organizational leadership competencies asserted in such contexts are thumbs up for forging constructive learning climates, endorsing student responsibility over learning processes, conflict solving and achievement of course learning objectives (Khan et al., 2023). During growing up as secondary school students, the formation of leadership skills in the process of collaborative learning becomes particularly important as students introduce themselves to the transition toward adulthood.

Schools' students at the secondary level need to have communication skills, academic efficiency and confidence, which are indispensable for their academic journey. They must have compassion and empathy for others in a broader sense and belief in what they do. Therefore, there is a need for effective leadership development among the students in secondary schools. Student' leaders are required to develop the skills of facing challenges and issues that come in their academic journey (Fullan, 2007). It supports them in their learning and positively influences their classmates' and the school environment. Leadership permits students to cultivate skills that can be used in adulthood (Marzano et al., 2005). It enables them to organize group activities, support peer-to-peer interactions and build better examples aiming to enhance individuals' confidence to cope with challenges of the future (Murphy & Johnson, 2011). It helps to create skills like listening, teamwork and the essence of solving problems (Darling-Hammond & Cook-Harvey, 2018).

Interaction among active participants in the advancement of acquisition skills is necessary in the contemporary educational system to generate an environment in the classroom that creates ownership, collaboration and an active learning community (Marzano et al., 2005). Collaborative learning theory states that a learning community means enabling students to create knowledge by interactions with their colleagues. This method supports the idea that students' leaders may increase the collaborative learning by expediting dialogues, organization disagreements, and confirming that all group partners make significant contributions (Knights & Wood, 2005).

In the classroom, student leaders can design and control group activities, confirming equitable job dispersal and active membership, where Johnson and Johnson (2013) emphasize the importance

of managed collaborative learning in the development of positive interdependence and individual accountability. One way that student leaders can encourage an inclusive classroom environment is by inspiring fellow interaction which is one of the aspects of collaborative learning. Energetic student leaders show positive features including active listening and positive response. These actions create the tone for well-mannered and positive peer collaborations (Marzano, Waters, & McNulty, 2005). Student leadership can improve learners' engagement through collaborative and active learning. This is exclusively true in the subject of science where practical workouts and discussions can enhance knowledge (Lord, 2001).

For active involvement, critical thinking and information retention, student leaders can develop a favorable situation by planning group activities, inspiring peer interaction and exhibiting positive performances. The positive impact of student-led collaborative learning is supported by experiential data, stressing the need for developing leadership skills in students to intensify educational outcomes (Stevenson et al., 2003). Student leadership is important to develop a collaborative classroom environment while acquiring knowledge of science at the secondary level. For the development of a collaborative classroom environment, student leadership is critical for advancing the information for learners at the secondary level. For active involvement, critical thinking and information retention, student leaders can develop a favorable situation by planning group activities, inspiring peer interaction, and exhibiting positive performances.

Student leaders can lead probe-centred creativities by inspiring their peers to pose questions, develop experimentations, and analyze data. This process is steady with the societal constructivist theory of Vygotsky (1978), which states that learning occurs by social interactions and sharing of knowledge. Student leaders help to develop a supportive and comprehensive environment by creating trust, respect and collaboration among peers. Gilliee (2015) observes that it is critical for studying subjects of science to have a dynamic classroom environment, sustained by strong peer connections, which enhances students' readiness to join and take intellectual risks. For struggles with challenging ideas and new procedures, student leaders can provide academic and demonstrative support to their peers to maintain inspiration. For acquiring the knowledge of science, a peer support system is particularly operative, where students may work on new ideas and processes. Springer et al. (1999) revealed that students may have advanced educational principles and more encouraging approaches to learning in supportive and peer-led settings.

Statement of the Problem

The positive impact of student-led collaborative learning is supported by experiential data, stressing the need for developing leadership skills in students to intensify educational outcomes (Stevenson et al., 2003). Furthermore, Pakistan's National Education Policy [NEP] (2009) identifies the values of modern instructional practices, such as student leadership and constructivist learning procedures for promoting collaborative learning among secondary school students. Therefore, the study was intended to fill this gap by assessing leadership skills possessed by students and the part played by students in promoting collaborative learning at the secondary level of education.

Objectives of the study

The objectives of the study are as follows:

- i. To find out the leadership skills of secondary schools' students.
- ii. To investigate the collaborative learning skills of secondary school students
- iii. To measure the relationship of students' leadership skills in the promotion of collaborative learning at the secondary level.

Research Methodology

The researcher used a one- group pre- and post-tests experimental research design which was quantitative and experimental. The students of grade 9th (40) from government higher secondary school Charbagh, district Swat, Khyber Pakhtunkhwa, Pakistan participated in the study. A pre-test was employed for students before the treatment and in the end, a post-test was conducted. The collected data were analyzed with a paired sample t-test to measure the differences in students' performance in pre- and post-tests. Proper permission from the head of the institution and consent of students were obtained. Confidentiality of data and acknowledgement of cited sources were maintained.

Results

1. Results of Inferential Statistics: Paired Sample T-Test to measure the change from Pre- to Post-tests Regarding Students' Leadership Skills (SLSpre and SLSpo)

2.

Table 1: Paired samples statistics of the same group on the measure of students' leadership skills before intervention (SLSpre) and after intervention (SLSpo)

Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	SLSpre	32.875	40	4.16449	0.65846
	SLSpo	61.125	40	2.95425	0.46711

The mean scores before and after intervention were 32.88 and 61.13, respectively, indicating a substantial increase in mean scores after intervention. While SD before and after intervention was 4.16 and 2.95, lower value after intervention means similar responses. The Std. error mean before and after intervention was 0.66 and 0.47. Lower value after intervention shows accuracy of values and the confidence of the researchers (see Table 1).

Table 2: Paired sample correlation of students' leadership skills before and after intervention with each other

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	SLSpre & SLSpo	40	0.189	0.243

A very low paired sample correlation value of 0.189 for SLS before and after intervention means a very weak positive relationship between the scores. Scores have increased significantly because of the impact of the intervention. Significance (sig.) higher than 0.05 (i.e., 0.243) indicated the

correlation was not statistically significant. There was no strong relationship in the scores of SLSpre and SLSpo and intervention has influenced the change in score (see Table 2).

Table 3: *Paired Sample Test: Statistical significance of the difference between the score before intervention (SLSpre) and after intervention (SLSpo)*

Mean	SD	Std. Error Mean	Confidence Interval of the Difference (95%)		T-Value	df	Sig. (2-tailed)
-28.25	4.62	0.73183	Lower	Upper			
			-29.73	-26.76	-38.6	39	<.0001

The mean score difference before and after the intervention was 28.25 indicating that the mean score after intervention (SLSpo) was higher than (SLSpre) by 28.25. The SD value of 4.62 indicated that most members similarly improved with some difference. The smaller value of the SD error 0.73 shows the accuracy and confidence of the researcher. The interval of the difference between -29.73(lower) and -26.76 (upper) was a real difference. The t-value statistics was -38.60, a substantial negative value. The mean difference was meaningful and strong (see Table 3). Sig. value (2-tailed) (p-value smaller than 0.05, i.e., 0.0001) indicated the difference was more significant and the improvement was real, not due to random chance.

Table 4: *Pair sample effect size and its interpretation to present the difference between pre-and post-tests*

			Standardizer ^a	Point Estimate	Confidence Interval (95%)	
					Lower	Upper
Pair 1	SLSpre - SLSpo	Cohen's d	4.62851	-6.103	-7.484	-4.716
		Hedges' correction	4.67361	-6.045	-7.412	-4.671

Effect size of pre-and post-tests sample for Cohen's d = 4.62 and Hedges' g = 4.67. Both values suggest that the effect size is extremely large; usually, d > 0.8 is considered great. Confidence interval also falls in the range of true effect size, i.e., 95%, for Cohen's d = (-7.48, -4.71) and Hedges' g = (-7.41, -4.67). They don't include 0 so the effect size is statistically significant and real. It means that the effect size was very large and the intervention had a considerable and very significant impact on post-test values. Therefore, the changes in post-test value were not only significant but also practically meaningful (see Table 4).

3. Inferential Statistics use Paired Sample T-Test for Pre- and Post-tests on the Measure of CLpre and CLSpO

Table 5: *Paired samples statistics of the same group on the measure students' attitude of collaborative learning before intervention (CLpre) and after intervention (CLpo)*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	CLpre	40.57	40	4.73334	0.74841
	CLpo	62.95	40	3.56586	0.56381

The mean score before and after intervention was 40.57 and 62.95 showing a large increase in scores after intervention. SD for CLpre was 4.73 and CLpo is 3.56. A lower value after intervention means similar responses. The SD error means 0.56 for CLpo was lower than the means scores which was accurate and the intervention was meaningful and impactful (see Table 5).

Table 6: *Paired sample correlation of students' attitude towards collaborative learning before and after intervention with each other*

		N	Correlation	Sig.
Pair 1	CLpre and CLpo	40	0.143	0.379

A very low paired sample correlation value of 0.143 means a very weak positive relationship between the scores of CLpre and CLpo and a significant increase in score. Significance value (sig.) higher than 0.05 (i.e., 0.379) means no significant correlation between the scores of CLpre and CLpo and the intervention for SLS has influenced the change in score (see Table 6).

Table 7: *Paired sample test: Statistical significance of the difference between the score before intervention (CLPRE) and after intervention (CLPO)*

		Mean	SD	SD Error Mean	Confidence Interval of the Difference (95%)		T-value	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	CLpre - CLpo	-22.37	5.5	0.87	-24.13	-20.61	-25.71	39	<.001

A very large difference in mean score of pre- (CLpre) and post-tests (CLpo) values was -22.37 while the absolute value of 22.37 indicated a significant difference. The SD value (5.50) indicated similar improvement with minor variation among individuals. The SD error mean (870) shows the precision of the difference and confidence of the researcher in the estimate of the mean difference was 22.37 (see Table 7).

The interval of the difference [-24.13 (lower) and -20.61 (upper)] indicated the score of CLpo was consistently higher than CLpre which is a real difference. The t-value statistics is -25.71 which is a larger negative value. Therefore, the difference was meaningful and strong.

Sig. value (2-tailed) (p-value smaller than 0.05, i.e., $p < 0.001$) indicated the difference was statistically more significant. Therefore, improvement was real and due to intervention and not by random chance.

Table 8: *Pair sample effect size and its interpretation to present difference between pre- and post-tests values regarding students' attitude towards collaborative learning as a result of intervention (acquiring leadership skills related to students)*

			Standardizer ^a	Point Estimate	Confidence Interval (95%)	
					Lower	Upper
Pair 1	CLpre - CLpo	Cohen's d	5.50379	-4.065	-5.012	-3.111
		Hedges' correction	5.55742	-4.026	-4.964	-3.081

Effect size measures the magnitude or effectiveness of the difference between pre- and post-test samples. CLpre and CLpo resulted in standardizer^a values for the two effect sizes as Cohen's $d = 5.50$ and Hedges' $g = 5.55$. Both values are extremely large, i.e., $d > 0.8$. The confidence interval was also in the true range of effect size with 95% certainty. For Cohen's $d = (-5.01, -3.11)$ and Hedges' $g = (-4.96, -3.08)$, these values did not include 0 so the effect size is statistically significant and real. The absolute value indicates a strong positive effect of the intervention (see Table 8).

Discussion

The study evaluated how students' leadership development affects collaborative learning. The study's paired sample t-test comparisons of test results before and after the intervention provide statistical evidence that students improved their leadership abilities and collaborative learning following the intervention. The data have shown students gained many leadership skills after intervention because the mean score of their responses increased from 32.88 to 61.13. The participants received better and uniform changes from the standard deviation value which has been lowered from 4.16 to 2.95. Reduction in standard deviation error proved the accuracy of the post-test mean score.

The study results support Dugan and Komives (2010) by showing that leadership development through experience-based learning enhances student abilities. Most of the students participated successfully in the improvement as the standard deviation reduced from 4.16 to 2.95. According to Field (2018), the lower standard error in the experiment leads to more reliable results in the post-test data.

The research carried out by Komives et al. (2011) links student leadership failures to their insufficient training background. The findings demonstrate that specific leadership programs help students become competent decision-makers and leaders (Dugan & Komives, 2010). Research by Rosch and Collins (2017) demonstrates that intentional focus on inclusive strategies in leadership development leads to the improvement of fair group interaction. The research study indicated that the participants had very weak abilities to solve and resolve problems but they acquired enhanced skills to manage disagreements and settle disputes by finishing it. Numerous research findings prove that applied learning strategies enable students to acquire conflict resolution competencies (Johnson & Johnson, 2014).

Correlation results of the paired sample test regarding leadership skills showed the value of correlation 0.189 meaning that the data before and after are not related to each other. Some other factors had made significant changes in pre- and post- test data which is the intervention. The study results confirm Komives et al.'s (2011) concept that leadership growth occurs through different paths linked to personal background and learning contexts. The small and insignificant connection

confirms that this training program helped develop leadership abilities in all students regardless of entry-level competence (Owen, 2012).

A paired sample test verified that student improved in leadership skills from pre- to post-tests as evident from the mean score difference, i.e., 28.25. The t-value was

-38.60 and p-value <.0001 shows that the changes were statistically significant and the intervention was impactful. Rosch and Stephen's (2017) research shows that extensive leadership training produces remarkable results in developing students' leadership qualities. The available statistical results prove that this intervention successfully teaches leadership skills to students.

Effect size analysis of Cohens' d and Hedges' g showed an extremely large impact of the intervention on participants. It was a dependable pattern because the confidence interval of the effect size from -7.48 to -4.71 remains strong. It means that the intervention produced an extremely powerful influence on student outcomes. The intervention produced a noticeable outcome that exceeds what Cohen (1988) defines as strong intervention impact. Research from Eich (2008) verifies these findings as he reports immersive experiential learning practices create strong improvements in students' leadership abilities.

In descriptive statistics of collaborative learning the students showed an immense improvement as the mean score of the data increased from pre-test value 40.58 to post-test value 62.95. The variation of data provided by the participants also decreased from 4.73 to 3.57. It means that the students uniformly adopted an increased collaborative learning attitude.

Research from Laal and Ghodsi (2012) supports these results because they found structured collaborative learning benefits students when they work as a team and communicate better. A smaller post-test standard error shows that the estimated mean is calculated with more precision (Tabachnick & Fidell, 2019). Multiple findings demonstrate that it is very difficult for students to work in collaboration because they lack experience participating in groups (Laal & Ghodsi, 2012). The findings support previous research which shows that delivering structured team learning boosts both personal and intellectual growth according to Slavin (2014).

Analysis of the correlation between pre- data and post-tests is statistically significant as the sig. value is 0.379 and the correlation value is very weak i.e., 0.143. It means that the value before and after intervention is not related to each other and the increase in collaborative learning attitude due to some other factor, i.e. intervention like students training regarding leadership skills. According to Johnson and Johnson (2013), students developed their teamwork skills equally through structured training with different competencies. The very low connection shows that multiple aspects including student engagement desire to succeed and teaching strategies influenced outcomes (Slavin, 2014).

The paired samples pre-and post- tests showed a great difference in the means, i.e., 22.37 and the test statistics produced a p-value of .001 which is a statistically significant value. It means that the intervention was important for the improvement of students' collaborative learning. The study findings support the research of Gillies (2016) who observed positive effects from structured collaborative learning interventions. The high statistical connection shows that students learnt to work together effectively through this treatment.

The findings demonstrated weak relationships between the pre- and post-test scores of leadership skills and collaborative learning proved that the intervention was impactful. The results of the response assessment demonstrated that the subject skills at the beginning of the study were not in

line with the final scores. A weak correlation indicated that students who started with lesser competencies benefited significantly from the structured interventions.

The paired samples t-test demonstrated an extremely significant enhancement of students' leadership skills and collaborative learning abilities with the measure of large difference well beyond what could be added to random differences. The results from paired t-tests showed the intervention produced significant effects due to mean differences exceeding significance levels. 95% confidence intervals for both variables proved the validity of the detected improvements in this research study.

Similarly, the effect sizes of intervention for Cohens'd and Hedges'g for collaborative learning was 5.50 and 5.56, respectively, and the confidence interval varies from -5.01 to -3.11 supported the reliability of the findings. The results of the findings match what Kirschner et al. (2006) revealed when they demonstrated that collaborative learning models boost teamwork and knowledge comprehension among students.

Conclusion

This study demonstrated that the intervention of students regarding leadership skills has led them to immense improvements in leadership competencies along with collaborative learning styles. Selective training programs effectively improved students' leadership abilities and their collaborative learning skills based on the significant post-test mean score increase for students' leadership skills and collaborative learning. The uniformity of participant improvement shown through standard deviation and standard error reduction established the reliable nature of the study result.

The intervention produced significant effects as demonstrated by extremely high values of Cohen's d and Hedges' g. The size of the observed changes surpassed 4.0 for leadership skills and 5.0 for collaborative learning which showed a great significant improvement beyond statistical significance. In a nutshell, the overall study concluded that improvement of students' leadership skills promoted collaborative learning in students which ultimately improved their communication skills, enhanced their general knowledge, improved their boldness, lessened their shy and hesitating nature, enhanced their critical thinking and problem-solving skills, engaged them in the learning environment, and made successful and responsible people of the society.

Recommendation

Recommendations of the study are as follows:

- 1. Educational institutions and administrations** should include structured leadership development training in the curriculum to teach students leadership and teamwork techniques and to include practical learning experiences through group projects team mentoring and students-led events so that students may gain leadership skills.
- 2. Teachers** should regularly evaluate students' leadership activities to help them understand their success and weaknesses and support group participation for each student to help them build value in their environment.
- 3. Students** should actively participate in learning leadership and group collaboration in activities. They should attend leadership sessions and find chances to control both classroom and extracurricular exercises. They need to understand themselves by looking at their best leadership skills and weak points and work together with classmates by accepting their responsibilities and creating an open environment that helps everyone.

4. **Parents and guardians** should help their children develop leadership abilities throughout their development and guide their children to lead in student councils and other outside-school groups.
5. **Policymakers, curriculum developers and government leaders** should make leadership and collaborative learning permanent building blocks of the education system. Leadership education should be reflected in subjects/schools and should provide funds and other resources for teacher training on leadership development and urge educational institutions to work with universities and outside organizations to give students practical leadership opportunities.

This was a single- group research; the same research can be exercised with prolonged interventions on two different groups, i.e., an experimental and a control group and further study can be carried out that increases in the leadership skills of students to promote their academic achievements.

Conflict of Interest

The authors showed no conflict of interest.

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