IJEMD-SS, 5 (6) (2026) https://doi.org/10.54938/ijemd-ss.2026.05.6.877

International Journal of Emerging Multidisciplinaries: Social Science

Research Paper
Journal Homepage: www.ojs.ijemd.com
ISSN (Online): 2958-0277



Impact Of Collaborative Learning on Student's Academic Performance Mediated by Self-Efficacy

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Abstract

The present research looks at how learners' cooperatively working together as part of a group impacts their overall results and whether believing that they will succeed (having high self-efficacy) influences this relationship. This investigation into the interrelationships between cooperative learning variables, self-efficacy, and student outcomes utilized quantitative methods (41 surveyed students with structured questionnaires). Using correlation, regression, and mediation analyses; it was determined that cooperative learning was positively related to academic performance, where high levels of belief in oneself positively correlated to higher levels of demonstrating successful academic performance. However, cooperative learning did not significantly associate with having high levels of belief in oneself (self-efficacy); therefore, no evidence was found to support self-efficacy as existing within that particular mediation role. This study results can provide assistance to educators for future practices.

Keywords: Cooperative learning, Self-efficacy, Academic performance, Student outcomes, Quantitative research

1. Introduction

1.1. Background and Context

Higher educational landscape is now deviating from the conventional teacher-oriented models and started focusing on pedagogical strategies such as student-centered interactive learning environments. They rely on the foundation of Social Interdependence Johnson and Johnson (2009). Their research supports the fact that students achieve higher levels when they work together toward shared goals because they exhibit positive interdependence and increased responsibility toward one another, thereby creating an environment that fosters mutual support. Similarly, Vygotsky's work (1978) regarding Social Constructivism supports the notion that a student's ability to learn is best enhanced by social interaction within the Zone of Proximal Development (ZPD). Meta-analyses have proven that the use of cooperative learning methods produces a statistically better performance level in students than a competitive or individualistic approach (Eslit, 2023; Johnson et al., 2000). In addition, Bandura's (1997) Social Cognitive Theory defines the factors driving motivation to learn as an outcome of internal psychological processes, specifically academic self-efficacy, which refers to one's belief in his or her ability to obtain success or fulfill challenges related to learning. Students who possess higher levels of academic self-efficacy are able to demonstrate greater levels of motivation, ultimately leading to higher levels of self-regulation and academic achievement (Honicke & Broadbent, 2016). It is evident that collaborative learning provides an objective approach to improving performance of students by establishing a structure for socially developing knowledge as a group; however, the self-efficacy of individual students defines their ability to personally engage and continue working toward developing academically.

1.2. Problem Statement

Collaborative learning, self-efficacy, and academic success have been identified as having a positive connection through documented evidence. However, there are significant gaps found in existing educational research as to how this phenomenon occurs. First, most of the available literature comes from Western or East Asian cultural contexts (e.g. Bandura, 1997; Johnson, 2000; Liu, 2022); therefore, there is a clear geographic gap regarding how this relationship occurs in developing countries. Second, there is a lack of empirical studies that investigate the structure of the relationship between self-efficacy to the experience of collaborating together as a group and

actual academic success (Arias, 2024). Finally, there is very limited literature on the existence of this relationship in higher education institutions located within Islamabad, Pakistan (Rubab, 2024; Zehra, 2025). It is necessary to undertake this study in order to determine whether the international theoretical paradigms of these concepts hold true within the contextualized socio-economic and pedagogical conditions that characterize higher education in Pakistan and if collaborative learning creates individual cognitive confidence through creating an environment that fosters group cooperation for extended periods of time, as opposed to being a short-term performance enhancement mechanism.

1.3. Research Hypotheses

In order to close these research gaps, the study has posed the following four core hypotheses which will be tested empirically

- **H1:** Collaborative Learning (CL) has a significant positive effect on the Student Academic Performance (SAP).
- **H2:** Collaborative Learning (CL) has a significant positive effect on the Self-Efficacy (SE).
- **H3:** Self-Efficacy (SE) has a significant positive effect on the Student Academic Performance (SAP).
- **H4:** Self-Efficacy acts as the mediator between Collaborative Learning (CL) and Student Academic Performance (SAP).

1.4. Research Objectives

To systematically respond to the hypotheses of the research, the following fundamental steps have been outlined to achieve the goal of this research:

- Assessing the Effect of Collaborative Learning on the Academic Performance of University Students in Islamabad
- Determining the Effect of Collaborative Learning on Students' Developed Academic Self-Efficacy
- Assessing the Predictor Relationship between Academic Self-Efficacy and Student Academic Performance

- Evaluating the Role of Self-Efficacy as a Cognitive Mediator between Collaborative Learning Environments and Student Academic Performance

1.5. Significance of Study

This study will be useful for professors and universities in Pakistan who wish to develop collaborative group-learning experiences and create a policy framework that enhances student confidence and performance. This study provides empirical, region-specific evidence regarding how professors can design collaboration-based group-learning curricula to improve academic performance and student confidence. The provision of individual feedback on experiences during group-learning activities is a useful vehicle for developing self-efficacy and motivation to engage optimally as a collaborative learner.

2. Literature Review

Collaborative learning builds upon numerous established theories of education in articulating the way social interaction improves the learning process and its outcomes. In particular, Social Interdependence Theory explains how working cooperatively on shared goals creates positive interdependence, increased accountability, and mutual support and as a result improves students' achievement levels (Johnson & Johnson, 2009). Similarly, Vygotsky's Theory of Social Constructivism explains how students develop knowledge through their social interactions with each other and that learning occurs optimally when students interact with one another in their Zone of Proximal Development (Vygotsky, 1978). Finally, Bandura's Social Cognitive Theory illustrates how learning will occur as a function of observations, interactions, feedback and ultimately through self-efficacy which determines student's motivation, effort, and persistence toward achieving proficiency on academic tasks (Bandura, 1997). Collectively these theories suggest that participating in collaborative learning is a method to improve academic performance both directly and indirectly through developing self-efficacy.

2.1. Collaborative Learning and Academic Performance

Numerous peer-reviewed studies have demonstrated the benefits of implementing collaborative learning within the classroom setting on academic performance. Specifically, Johnson et al. (2000) conducted a meta-analysis of existing studies and found that cooperative learning methods

provided statistically significant increases in student academic performance versus either long-term or short-term competition and student cooperation. In line with this, Tuncer and Dikmen (2017) also provided evidence that collaborative learning had a positive impact on student performance regardless of type or location of the institution of higher education. Eslit (2023) supported the findings of these prior studies by conducting an updated meta-analysis of randomized control trials. His analysis concluded that cooperative learning has a positive effect on the academic achievement of students.

Furthermore, technology-supported collaborative learning has demonstrated a positive effect on student achievement. According to Talan (2020), computer-supported collaborative learning enhances academic performance by encouraging active participation, facilitating knowledge sharing, and improving problem-solving abilities of the students participating. Thus, collaborative learning stimulates a more profound level of cognitive involvement in the academic process while providing students with opportunities to learn from each other thereby enhancing their ability to perform academically.

2.2. Self-Efficacy and Academic Achievement

Self-efficacy is the belief that we are capable of succeeding (Bandura, 1997). Educational research continues to identify self-efficacy as one of the best predictors of academic success. Honicke and Broadbent (2016) note that students who have high levels of academic self-efficacy exhibit more motivation, persistence, self-regulation, and academic achievement. When students believe in themselves, they are more likely to use effective learning strategies, rise to challenges, and stick with their goals. Given the critical role self-efficacy plays in determining student success, it is an important factor when examining the relationship between collaborative learning and academic achievement.

2.3. Self-Efficacy as a Mediator relating to Collaborative Learning and Academic Achievement

Recent literature suggests self-efficacy acts as an important psychological mechanism linking collaborative learning with academic success. Students in collaborative learning environments have the opportunity to receive peer support, constructive criticism, assist each other in solving problems, and most importantly, experience success. Liu et al. (2022) found that students used

social media for collaborative learning, which improved their learning, and that the relationship was strengthened through their academic self-efficacy. In the process of participating in collaborative activities, students build confidence in their abilities, which leads to greater engagement and improved academic performance.

Collaborative learning enhances self-efficacy, which improves academic achievement, through observation of peers who achieve success, encouragement, and mastery via teamwork (Bandura, 1997). Therefore, self-efficacy is the way to understand how collaborative learning leads to improved academic performance.

2.4. Research Model

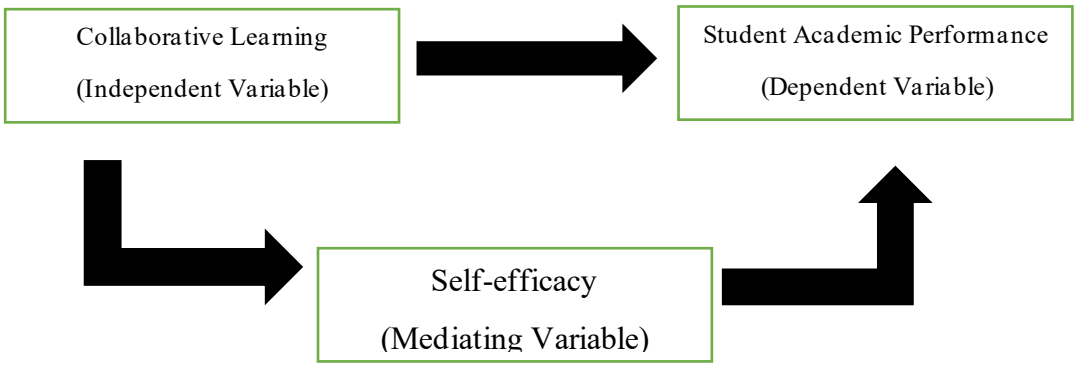


Figure 1: Model of research

3. Research Methodology

3.1. Research Paradigm

This research was conducted within the post-positivist paradigm; this paradigm assumes that there is an objective reality that can be studied objectively using empirical observations and statistical analyses. Post-positivist researchers believe hypothesis testing is an important aspect of science because it enables researchers to explain how variables relate to one another using scientific methods (Creswell & Creswell, 2018). This research applied a quantitative research approach, since quantitative research involves collecting numerical data and using statistical methods to test hypotheses and explore relationships between variables (Saunders et al., 2019). Furthermore, as the purpose of this study was to examine the effect of CL on AA and to determine if SE mediated

the relationship between CL and AA, the quantitative research approach was a logical choice for this study (Creswell & Creswell, 2018; Saunders et al., 2019).

3.2. Research Design

The study seeks to understand how collaborative learning impacts students' academic performance through self-efficacy. The researcher used the deductive approach to develop the hypothesis prior to conducting the study in order to test the hypotheses with empirical evidence when the data were collected (Bryman 2016; Sekaran & Bougie 2016).

3.3. Time Horizon

The research adopted a cross-sectional time horizon, which meant that data were collected from the participants at one point in time and examined how variables were related to each other through a model of theory as efficiently as possible (Fraenkel et al., 2019). This form of data collection was deemed appropriate for this study as the study was focused on finding out how collaborative learning, self-efficacy and academic performance were related to each other now rather than longitudinally.

3.4. Target population

As part of this research study, university students were selected as they are part of a large institute of higher education (both public and private) and therefore are a good representation of the university population (which would use collaborative learning), as evidenced by the fact that collaborative learning practices are prevalent in higher education. Accordingly, these criteria make it an appropriate selection of a research study's target population when exploring the relationship between self-efficacy, academic performance, and collaborative learning in university students. Sekaran & Bougie (2016) define a population as "the total set of people who share certain characteristics relevant to the given research project."

3.5. Sampling Technique

The survey utilized a non-probability convenience sampling method to gather data for analysis. The survey instrument link was sent out via WhatsApp to student groups (from the public and private universities in Pakistan) who were informed by either one or several people of that link,

then participated in the research study as participants voluntarily. Convenience sampling provides researchers with access to readily available samples of individuals, which is why it is often used in social science research; convenience sampling also provides a cost-effective way of collecting data from research subjects (Etikan et al., 2016). A total of 41 valid responses were received by the researcher for statistical analyses.

3.6. Data Analysis Technique

The data collected is analyzed with the Statistical Package for the Social Sciences (SPSS 27 version). The collected responses are analyzed using descriptive statistics (e.g., frequency, percentage, mean, median, mode, standard deviation, variance) to summarize the respondents' demographic characteristics and overall response. Additionally, inferential statistics is used to identify relationships between variables using correlation. The correlation indicates the strength and direction of the association between collaborative learning and self-efficacy, and between collaborative learning and student academic performance. Regression is used to determine the influence of collaborative learning on academic performance and to investigate the mediating role of self-efficacy on collaborative learning and student academic performance. Reliability analysis is conducted using Cronbach's Alpha coefficient to evaluate internal consistency for each scale of measurement. An acceptable level of reliability is > 0.70 (Hair et al., 2019).

3.7. Unit of Analysis

The individual student at a university was the analysis unit in this research. Collaborative learning experiences, self-efficacy belief, and academic performance perception data was collected from individual respondents. The analysis unit must correspond to the level at which theoretical variables were measured and hypotheses were tested (Babbie, 2020). Since all variables were measured at the student level, the individual student was the correct unit of analysis.

3.8. Study Setting

Conducted in a non-manipulated way using data that has been taken from students' natural contexts; there is no contrived manipulation of behaviour from those participating in this study (Bell et., al 2019). A benefit of conducting research in non-manipulated settings is that researchers can observe what happens in real life situations and thus create knowledge that is applicable to the

larger context outside of the research. In this study, the students answered the surveys while they were in class and going about their normal academic duties at their respective universities.

3.9. Researcher Interference

Low researcher interference was present in this study. The researcher did not influence or manipulate study variables nor did he or she intervene in participant's educational activities. The researcher observed participants' naturally occurring perceptions of collaborative learning, self-efficacy, and academic performance by using a survey questionnaire. Low-interference studies are designed when researchers wish to identify the relationship between variables located in their natural environment without implementing the experimental controls (Saunders et al., 2019). Since the purpose of the study was to determine the relationships and mediation among variables rather than establishing experimental causality, therefore minimal researcher interference was deemed appropriate.

3.10. Validity and Reliability

The study determined the quality of measurements based on the study's assessments using both validity and reliability procedures. Reliability is defined as how consistently a measurement instrument provides the same information over time; whereas, validity determines whether an instrument measures what it is supposed to measure (Hair et al., 2022). Cronbach's Alpha was used to test the degree of internal consistency between the measurements (Nunnally & Bernstein, 1994), where values greater than .70 indicate acceptable levels of reliability. To have content validity, measurements were taken from measurement scales that had already been validated in previous studies of collaborative learning, self-efficacy, and academic performance.

4. Research Instrument

4.1. Student's Academic Performance Scale

Students' academic performance was evaluated via the Sabri and Jabir 2021, 24-item Students' Academic Performance Scale (SAPS) administered simultaneously to two cohorts, school leaders and teachers who were expected to use the scale to assess students' academic performance. From the researchers' work, they identified two dimensions of academic performance: a) Students'

Individual Performance (16 items) and b) Students' Group Performance (8 items). They recognize that academic performance consists of both a process and an outcome; therefore, they do not view it simply as grade points or the results of a student's test. The researchers selected the scale because it was specifically designed to give a comprehensive assessment of how well students perform in school by including Cognitive (knowledge), Behavioral (skill), Affective (attitude), and Social (capacity to interact) variables that affect how well students do. Using both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to determine the psychometric properties of the SAPS, the researchers established those properties of the scale to be very highly valid, indicating that the understanding and measurement of students' academic performance is based on two distinct factors - Individual Performance and Group Performance.

The SAPS showed acceptable model fit indices (RMSEA = .03, NFI = .90, RFI = .90, TLI = .92, CFI = .93), which were used by the authors when determining their conclusion that the scale is highly valid and provides a reliable method to assess all aspects of student academic performance **[Appendix 1]**. The researchers adopted previously validated scales for collaborative learning, self-efficacy, and academic performance; therefore, the reliability and content validity of the study were improved and the constructs being measured were assessed accurately and reliably through collaboration.

4.2. Self-efficacy Scale

The GSES Scale was created by Schwarzer and Jerusalem (1995) as part of their research on self-efficacy, the belief in one's ability to cope with challenges, solve problems, reach goals, and overcome challenges. The GSES scales used in this study provide 10 sample questions, including "I can always manage to find a solution to difficult issues, if I try hard enough"; "I usually manage to handle whatever comes my way". Using a 4-point Likert scale (1 = Not at all True; 2 = Rarely True; 3 = Mostly True; 4 = Exactly True), responses to these items were used to measure participants' generalized self-efficacy beliefs across a variety of academic contexts and learning experiences. GSES has consistently demonstrated excellent reliability (Cronbach's alpha coefficient) typically ranging from .76 to .90 across different countries and populations (Schwarzer & Jerusalem, 1995; Scholz et al, 2002) **[Appendix 2]**. The GSES measures generalized self-efficacy beliefs (i.e., self-efficacy that is not task-dependent); therefore, it is especially useful for

evaluating confidence among students who are taking on academic challenges or completing task-type learning.

4.3. Collaborative Learning Scale

Collaborative learning was measured with a scale consisting of ten items that have been adopted from Cagatan and Quirap (2024). This scale assessed students' perceptions of the collaborative learning experience through indicators such as: (1) Positive Interdependence, (2) the Willingness to Work Together, (3) the Sharing of Knowledge, (4) Participation as a Group and (5) Collective Success. Examples of items on the collaborative learning scale are: "I value the sharing of ideas" and "I learn more productively by learning with my group members compared to working on my own." All responses were measured on a five point Likert scale with the following: 1 = Strongly Disagree to 5 = Strongly Agree **[Appendix 3]**.

The scale is also based on Social Interdependence Theory which theorizes that when individuals work together on a common goal, they will achieve improved learning outcomes compared to when they work independently (Johnson & Johnson, 2018). Based on previous data, the collaborative learning scale has been found to be an effective instrument in measuring collaborative learning and demonstrated a statistically significant positive relationship with the academic performance of students (Cagatan & Quirap, 2024). Furthermore, the items within the scale comprehensively measure the core constructs of collaborative learning: positive interdependence, promotive interaction, and individual responsibility, thus making the collaborative learning scale a relevant tool to achieve the existing goals of this research.

4.4. Ethical Considerations

The ethical guidelines that have been implemented will be respected throughout the research process. Participants were informed about the purpose of the study before participating and given enough information to make an informed decision whether or not to participate in the study. Participation was completely voluntary and if a participant chose to withdraw, they could do so without fear of any repercussions or negative consequences. Confidentiality and anonymity were upheld by not collecting identifying information from participants and reporting results in aggregate form.

5. Results And Discussion

The empirical data, descriptive statistics, correlational statistics, regression statistics, and related discussions regarding the effects of collaborative learning on academic achievement as well as self-efficacy as a mediator between collaborative learning and academic achievement are discussed below.

Table 1: Sample Size and frequency distribution

		GENDER	AGE	STUDY LEVEL
N	Valid	41	41	41
	Missing	0	0	0

Table 2: Male and Female respondent' percentage

GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	7	17.1	17.1	17.1
	Male	34	82.9	82.9	100.0
	Total	41	100.0	100.0	

Of the 41 people who responded to our survey, 34 are men. That means that 82.9% of our total sample consists of men. There were only 7 women participating in our survey, which means 17.1% are women. The overwhelming majority of our participants in this sample fall into the category of male. Keep this in mind when looking at the results, which will reflect primarily the experiences of male students in this group learning setting.

Table 3: Frequency of Different Age groups of Respondents

- **AGE**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19	2	4.9	4.9	4.9
	20	2	4.9	4.9	9.8
	22	6	14.6	14.6	24.4
	23	10	24.4	24.4	48.8
	24	8	19.5	19.5	68.3
	25	2	4.9	4.9	73.2
	26	4	9.8	9.8	82.9
	27	1	2.4	2.4	85.4
	28	1	2.4	2.4	87.8
	30	1	2.4	2.4	90.2
	34	1	2.4	2.4	92.7
	38	1	2.4	2.4	95.1
	40	1	2.4	2.4	97.6
	42	1	2.4	2.4	100.0
	Total	41	100.0	100.0	

A wide range of ages among respondents (ages 19-42) was apparent from an analysis of age demographics.

I. Concentration group: Respondents tend to cluster in their 20s, primarily early-to-mid 20s; however, respondents aged 23 comprised the largest group of respondents (n=10; 24.4%); the next largest groups are 24 years (n=8; 19.5%) and 22 years (n=6; 14.6%). Students in the 22-24-year age range comprise 58.5% of respondents.

II. Young outlier: Only 2 respondents between ages 19 and 20; each account for 4.9% of total respondents.

III. Mature/non-traditional group: The mature/non-traditional outliers are 27-42 years and have only one respondent per age (n=1; 2.4%); however, there are also four respondents who were aged 26 (9.8%).

- **Study Level**

Table 4: Study Level Frequency Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undergraduate	12	29.3	29.3	29.3
	Graduate	14	34.1	34.1	63.4
	Masters	15	36.6	36.6	100.0
	Total	41	100.0	100.0	

The data show that different levels of post-secondary education are fairly evenly represented.

I. Undergraduate Students: This group performed with 12 participants (29.3% of total sample) and are in the first tier of their university education.

II. Graduate Students: This group contains 14 participants (34.1% of the total sample).

III. Masters Students: The largest single academic group is composed of post-graduate Masters' students with 15 participants (36.6% of the total).

5.1. Descritptive Analysis

Table 5: Descriptive Analysis of Variables

	CL	SAP	SE
Mean	32.5707	81.8547	28.7195
Median	34.4000	83.2083	28.3000
Mode	34.40	82.21[a]	27.30
Std. Deviation	9.39019	11.43354	4.79537
Variance	88.176	130.726	22.996
Skewness	-.836	-.096	-.277

Std. Error of Skewness	.369	.369	.369
Kurtosis	.250	-.191	-.102
Std. Error of Kurtosis	.724	.724	.724
Minimum	9.10	58.08	18.20
Maximum	45.50	109.17	36.40
a. Multiple modes exist. The smallest value is shown			

The mean, median, and mode were analyzed for the three primary variables in this research (Collaborative Learning, Students' Academic Performance and Self-Efficacy). Collaborative Learning (CL) found a mean score of 32.57, with a median and mode both equal to 34.40, revealing a small leftward skewness in the data; however, CL had generally high levels of collaboration among students. For Students' Academic Performance, (SAP) these were substantially higher than Collaborative Learning and had an overall mean of 81.85 and a median of 83.21 with mode averaging 82.21 across the sample which indicates positive academic outcomes beyond expectation. The cluster of Self-Efficacy scores followed a tight pattern with an average of 28.72, median of 28.30 and mode of 27.30 demonstrating similar levels of stable confidence amongst students.

Student Academic Performance (SAP) showed the greatest level of variance, at a Variance of 130.726 and Standard Deviation (SD) of 11.43354, with a total score range from 58.08 to 109.17, making substantial variances within the samples represent many areas of academic performance from those who showed little to no success through to those who show extremely high levels of performance. Collaborative Learning (CL) produced a similar great level of dispersion, with a Variance of 88.176 and SD of 9.39019 across a range of scores from 9.10 to 45.50; indicating significant differences among individual students' experiences/attitudes about their ability to work in groups; some students rated their groups significantly lower than the maximum score, while the remainder rated close to the maximum. Self-Efficacy (SE) had the lowest level of dispersion, having a Variance of 22.996 and an SD of 4.79537; with scores from 18.20 to 36.40. This indicates that there is little variance among these students' perceptions of their own ability to be successful academically and that these perceptions are less volatile than their actual performances or how they perceive others have performed in Collaborative Learning settings.

5.2. Distribution and Normality (Skewness and Kurtosis) Analysis

To assess the structural validity of parametric statistics (such as Pearson correlation and Hayes PROCESS mediation), the degree of normality of the distribution of the data by evaluating skewness (asymmetry) and kurtosis (the "peakness" or "flatness" of the distribution) is observed. According to common statistical standards (for example, Kline, 2016, pp. 136-137), normally distributed data is considered acceptable within a skewness range of -3 to +3, and an excess kurtosis of -10 to +10 (though the more stringent thresholds used to assess normally-distributed data would be visible at the extremes from -1 to +1).

5.2.1. Collaborative Learning (CL)

- Skewness (-.836): negative skew, suggesting that almost all of the students have high scores (positional perspective = almost exclusively positive perceptions of collaborative learning). Thus, the distribution of scores is skewed to the negative because the majority of the students received high grades.
- Kurtosis (.250): since the kurtosis is slightly positive, this suggests that the distribution is slightly leptokurtic (peaked), indicating that scores cluster relatively close to the midpoint of the sample distribution.

5.2.2. Student Academic Performance (SAP)

- Skewness (-.096): almost zero; extremely symmetrical; exhibits a nearly perfectly normal distribution.
- Kurtosis (-.191): because the kurtosis is slightly negative, this indicates the distribution is slightly platykurtic (less peaked); however, this distribution is functionally nearly perfectly normal.

5.2.3. Self-Efficacy (SE)

- Skewness (-.277): very slightly negatively skewed, indicating a slight concentration of students with healthy baselines of self-efficacy.
- Kurtosis (-.102): very slightly negatively skewed; this indicates a safe degree of similarity in "flatness."

5.3. Correlation Analysis

Table 6: Correlation Analysis of SAP and SE

		CL	SAP	SE
CL	Pearson Correlation	1	.381*	-.018
SAP	Pearson Correlation	.381*	1	.378*
SE	Pearson Correlation	-.018	.378*	1
*. Correlation is significant at the 0.05 level (2-tailed).				

Prior to conducting full-blown mediation modeling, a bivariate correlation analysis (Pearson Correlation) was performed to determine preliminary relationship direction, strength, and significance between three core variables, Collaborative Learning Student Academic Performance and Self-Efficacy.

5.3.1. Relationship between Collaborative Learning and Student Academic Performance (H1 testing)

Statistical Findings: CL and SAP exhibits a statistically moderate significant correlation (Pearson coefficient of r = .381; 2-tailed significance = p = .014). Given that the p-value (p = .014) is less than the standard alpha level for significance (alpha = 0.05), this finding suggests that the relationship between these variables is statistically significant; further, because r is a positive value, this indicates that CL and SAP have a moderate-to-strong, positively linear correlation with one another. This finding supports H1 that there is a positive relationship between students' perceptions of engagement in collaborative learning experiences and their performance academically (suggesting additional empirical evidence).

5.3.2. Relationship Between Collaborative Learning and Self-Efficacy (Testing H2)

The Pearson's correlation coefficient indicates r = -0.018 with a significance level of p = 0.910, indicating no statistically significant correlation between collaborative learning and self-efficacy. The p-value indicates that there is no statistically significant correlation between collaborative learning and self-efficacy, as it is above the threshold of 0.05. The R-value of collaborative

learning to self-efficacy is essentially zero, thus indicating that there is no linear relationship in this data set. These results do not support Hypothesis 2. A student's level of experience of or score on collaborative learning does not have a statistically significant mathematical relationship to that student's level of personal academic self-efficacy within this sample of students.

5.3.3. Relationship between Self-Efficacy and Student Academic Performance (Testing H3)

The correlation between Self-Efficacy and Academic Performance of Students was computed statistically with a Pearson r correlation coefficient = 0.378, and a p-value of 0.015. This means that since the p-value (0.015) is less than the critical alpha (0.05), this statistical analysis supports the hypothesis that there is a statistically valid relationship between Self-Efficacy and Academic Performance of Students. In addition, the positive r-value indicates a moderate or positive correlation. The result provides moderate support for the third hypothesis, which indicates that as a Student's self-efficacy increases or strengthens, then their actual academic performance will also increase or strengthen in a positive relationship.

5.3.4. Critical Insight for mediation analysis (hypothesis 4)

According to the traditional mediation analysis methodology (Baron & Kenny or Hayes), the existence of a substantial total correlation between the Independent variable and the Mediator is a necessary condition to establish mediation through traditional indirect pathways. Therefore, because of the virtually non-existent correlation between Causal Learning and Self-Efficacy ($r = -.018$, $p = .910$), it is very likely that the formal mediation model analysis (hypothesis #4) will result in a conclusion of no-significance, due to the disconnect between the Independent (predictor) variable and the Mediator.

5.4. Regression Analysis

Table 7: Total, direct and indirect effects of X on Y using Regression Analysis

```
************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **************

Total effect of X on Y
     Effect         se          t          p       LLCI       ULCI
      .4645      .1802     2.5771      .0139      .0999      .8290

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
      .4730      .1660     2.8488      .0070      .1369      .8091

Indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
SEtotal     -.0085      .0991     -.1621      .2395

************************ ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000
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The PROCESS mediation results indicate that there is a positive effect of Collaborative Learning (CL) on Student Academic Performance (SAP) when both are measured simultaneously as Collaborative Learning has a direct effect on Academic Performance (β = 0.4645; p = .0139) and on Academic Performance after controlling for Self-Efficacy (SE) as a mediator (β = 0.4730; p = .0070). Thus, Hypothesis 1 is supported. The negative indirect effect through Self-Efficacy was found to be non-significant (β = -0.0085) as the 95% bootstrap confidence interval (BootLLCI = -0.1621; BootULCI = 0.2395) included a value of 0. Therefore, Hypothesis 4 was not supported and Self-Efficacy does not mediate the relationship between Collaborative Learning and Student Academic Performance

Table 8: R2 and F values of SE, CL and SAP

Outcome Variable	Predictor Variable(s)	R2	F	Coefficient (β)	SE	t-value	p-value	95% Confidence Interval
Self-Efficacy **(M)**	Collaborative Learning (X)	.0003	.0129	-.0093	.0818	-.1136	.9102	[-.1747, .1561]
Academic Performance **(Y)** ***(Total effect Model)***	Collaborative Learning (X)	.1455	6.6417	.4645	.1802	2.5771	.0139	[.0999, .8290]
Academic Performance (Y)	Collaborative Learning (X)	.2937	7.8994	.4730	.1660	2.8488	.0070	[.1369, .8091]
(Full Mediation Model)	Self-Efficacy (M)			.9179	.3251	2.8232	.0075	[.2597, 1.5760]

5.4.1. Statistical Interpretation

The regression analysis indicates that (X) is significantly and positively correlated to the total effect (Beta = .4645, p = .0139) and direct relation (Beta = .4730, p = .0070) on (Y) (Academic Performance). (M) (Self-Efficacy) also positively and independently predicts a greater extent of (Y) (Beta = .9179, p =.0075). However, (X) (Collaborative Learning) does not have a significant prediction of (M) (Beta = -.0093, p = .9102). Collectively, (X) and (M) account for 29.37% of the total variance in (Y) and there is no mediation path between (X) and (M).

5.5. Reliability Analysis

5.5.1. Overall Scale Reliability Test

Table 9: Reliability Analysis Test of whole scale and inter-item

Reliability Statistics	
Cronbach's Alpha (*a)*	N of Items
.916	44 (Complete Scale)
.916	10 (CL Scale)
.864	24 (SAP Scale)
.881	10 (SE Scale)

5.6. Scale Reliability Analysis

To assess the internal consistency and reliability associated with the instruments included in this primary research study, a calculation of the overall alpha coefficient as well as the alpha coefficient of each individual subscale; Collaborative Learning (CL), Student Academic Performance (SAP), and Self-Efficacy (SE) was completed. An alpha of .70 or higher (as per standardized psychometric practices) indicates acceptable levels of internal consistency between items measuring the same construct, while an alpha greater than .80 indicates very strong degrees of reliability (Hair et al., 2019).

- Overall Scale: The total instrument, containing 44 items, had an overall Cronbach's alpha of .916 indicating excellent reliability.
- Collaborative Learning Subscale: This subscale, consisting of 10 items, had an extremely high reliability coefficient of .961.
- Student Academic Performance Subscale: Made up of 24 items, this scale had a reliability coefficient of .864, indicating a high overall level of internal reliability.
- Self-Efficacy Subscale: This subscale used 10 items and had a high alpha value of .881.

5.6.1. Interpretation

The reliability analysis indicates that all subscale measures far exceed the widely accepted .70 psychometric reliability threshold. Therefore, all high Cronbach's alpha values suggest sufficient consistency and accuracy across the latent constructs as captured by their respective questionnaire items from the sample of students. Thus, the stability of the data collected is high and free of structural error; therefore, all collected data was statistically valid for purpose of completing robust regression and mediation analysis experiments.

5.7. Validity Test (Face and Construct Validity)

Table 10: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy for SE Scale	.832
Kaiser-Meyer-Olkin Measure of Sampling Adequacy for CL Scale	.902

The measure model of this study's assessment of the relationship between collaborative learning and students' academic performance, as mediated by self-efficacy, includes evaluations of reliability and validity for all scales (construct validity, face validity). An exploratory factor analysis (EFA) with principal axis factoring was used to establish construct validity of the 10-question collaborative learning (CL) scale by demonstrating excellent data suitability (KMO = .902, $p < .001$, Bartlett's test) and extracting one underlying factor with very strong factor loadings (i.e., .727 to .939 for all CL items). This provides evidence of convergent validity. An EFA using varimax rotation was performed on the general self-efficacy (SE) scale, resulting in evidence of good data suitability (KMO = .832, $p < .001$) and two valid factors; seven items captured problem-solving resilience (i.e., factor 1), and two items assessed situational adaptability (i.e., factor 2) with factor loadings of .583–.860 and .748 and .825, respectively. Only one weak SE item was excluded due to reduced scale cohesion. Lastly, rather than using statistical factor analyses, the SAPS was established using the previous work of Sabri and Jabir (2021) by obtaining their instrument without any modifications to its content and qualifying to complete the items as academic measures. Factor matrix are considered for CL and SE loading factors **[Appendix 4]**

5.8. Theoretical and Practical Implications

- **Theoretical Implications:** This study expands the field of modern educational psychology by challenging the assumption of a systematic relationship between a social environment for learning and a person's individual sense of cognitive competence. The strong direct link between academic performance and collaborative learning supports Vygotsky's (1978) Social Constructivism theory. Conversely, only a very weak association between collaborative learning and self-efficacy weakens Bandura's (1997) Social Cognitive theory. Together, these findings show that collaborative learning environments do not necessarily provide individuals with the vicarious or mastered experiences that they need in order to develop self-efficacy.
- **Practical Implications:** Academic institutions and educators should consider group projects as beneficial ways to enhance the quality of performance on a short-term basis but should not consider collaborating on a group project to be an effective way to enhance individual student self-efficacy. To improve students' self-efficacy, instructors need to design interventions that are aligned with the group work experience, such as individualised feedback about mastery, journals for self-reflection, and individualised frameworks for goal setting, to reduce the likelihood that students who are quieter or less confident will be overshadowed by others in a group task.

6. Conclusion

The present study examined the effect of Collaborative Learning (CL) on Student Academic Performance (SAP) mediated by Self-efficacy (SE) among undergraduate, and post-graduate students at higher education institutions in Islamabad Pakistan. Statistical analysis provided significant information to evaluate four core hypotheses:

- H1is supported. There was a statistically significant moderate to strong (positive direct) relationship between CL and SAP (beta = .4645; p = .0139).
- H2 is not supported. There was no statistically significant relationship between CL and SE (r-value = -.018; p = .910); this indicated that group work had no significant impact on students' internalized self-belief about their ability to be academically successful.
- H3 is supported. SE was an independent, statistically significant predictor of higher levels of SAP (beta = .9179; p = .0075).

- H4 is not supported. Since CL did not predict SE, SE did not mediate between CL and SAP (beta = -.0085; Bootstrap CI included zero).

7. Knowledge Contribution

This study is a significant contribution to the field of educational psychology as it addresses a larger geographical and contextual gap in the literature by analyzing the psychological and behavioral factors associated with higher education in Islamabad, Pakistan (research site), in contrast to previous studies on these variables which were focused in the United States and East Asia. Furthermore, this study will add to contemporary educational psychology by testing the assumption in social learning theory that an individual's cognitive ability is enhanced in a socially constructed learning environment. In so doing, it substantiates Vygotsky's Social Constructivism theory with respect to peer interaction and performance; however, it offers an alternative view of Bandura's Social Cognitive theory by showing that an individual will not necessarily be able to acquire the vicarious or mastery experiences needed to develop self-efficacy in group environments.

8. Study Limitations

There are also several limitations concerning the methodological approach taken. Firstly, the study sample was limited to 41 valid responses. Secondly, the sample contained a very high percentage of male students: 82.9% (n = 34), thereby limiting the generalizability of the results to female students. Thirdly, the data were collected using cross-sectional convenience sampling via WhatsApp, thus capturing the relationships among the variables at one point in time, as opposed to tracking the psychological development of the subjects over time.

9. Practical Recommendations

Teachers and universities need to consider using cooperative learning experiences (group projects) as a method of improving fixed-term results from courses and participant performance. However, there should not be an expectation that cooperative learning experiences (group projects) alone will support the development of long-term confidence or self-efficacy of individuals. To support the building of self-efficacy collectively, teachers should embed, where possible, tailored interventions into cooperative project work. These interventions may include individualized

progression feedback, self-reflection journals, and individual goal setting frameworks. These specific types of interventions will ensure that students, particularly quiet or less confident ones, will not experience overshadowing by more confident and domineering group members in the execution of group work.

10. Future Research Suggestions

In establishing future research agenda to extend the results of this study, longitudinal research designs should be implemented to explore how and if there is a change in the levels of self-efficacy as a result of increased exposure to cooperative project experiences at the end of an academic degree. In addition, researchers should broaden their scope of inquiry beyond Central Punjab and utilize probability sampling so as to achieve a greater and more gender-balanced population; enabling multi-group comparisons to be made between public and private education institutions. Finally, investigations into specific moderators are warranted in order to better understand which of the following moderators (e.g., group size; familiarity with peers; and/or identification to own contributions to group tasks) will impact student self-efficacy as a result of participating in cooperative project work.

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Appendix 1

Appendix 1: SAP Scale

S. No	Statement	Factor Loading
Sub-dimension One: Students' Individual Performance		
1	I can discriminate between minor information and major idea of the content.	.50
2	I complete my reading and writing tasks daily.	.50
3	I make notes for my subjects in an innovative way	.53
4	I ask the teachers different questions for teaching chapter	.54
5	I attempt application-based questions during class tests.	.58
6	I am able to write the central idea of the content in my own words.	.52
7	I ignore the distractive thoughts to focus on discussions.	.50
8	I am not scared by lengthy assignments.	.48
9	I am confident to enjoy aloud reading in class.	.51
10	I redouble the effort If I get low remarks about my reading performance	.50
11	I remain relaxed during oral and written class tests.	.51
12	I download audio and videos from the internet related to my subjects.	.47
13	I keep a smiling face during a discussion with my teachers and peers.	.52
14	I draw tables and figures to improve visual expression during writing.	.54
15	I maintain neat handwriting throughout the paper.	.47
16	I am excited to learn something new every day.	.47
Sub-dimension Two: Students' Group Performance		
17	I share my learning experiences with my friends and teachers	.52
18	I put effort to maintain good relations with my class fellows and teachers.	.61
19	I seek help from my fellows to get a better understanding of the lessons.	.72
20	I communicate with teachers to solve my learning difficulties.	.66
21	I make motivated friends in class to improve my performance.	.63
22	I contact my class fellows for study discussion through mobile.	.63
23	I discuss my test performance with my subject fellows.	.50
24	I communicate patiently with my classmates while they are angry	.45

Scale taken from Sabri and Jabir 2021, 24-item Students' Academic Performance Scale (SAPS)

Appendix 2: General Self-Efficacy Scale

	Not at all true	Barely true	Moderately true	Exactly true
1. I can always manage to solve difficult problems if I try hard enough.	1	2	3	4
2. If someone opposes me, I can find means and ways to get what I want.	1	2	3	4
3. It is easy for me to stick to my aims and accomplish my goals.	1	2	3	4
4. I am confident that I could deal efficiently with unexpected events.	1	2	3	4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	1	2	3	4
6. I can solve most problems if I invest the necessary effort.	1	2	3	4
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	1	2	3	4
8. When I am confronted with a problem, I can usually find several solutions.	1	2	3	4
9. If I am in a bind, I can usually think of something to do.	1	2	3	4
10. No matter what comes my way, I'm usually able to handle it.	1	2	3	4

GSES taken from Schwarzer and Jerusalem (1995)

Appendix 3: Collaborative Learning Scale

Indicators	Mean	SD	Description	Interpretation
1. I find myself productive learning with my groupmates than learning alone.	4.14	0.92	Agree	High
2. I am confident working in groups than working alone.	4.11	0.92	Agree	High
3. Asking questions with my groupmates is helpful.	3.91	0.88	Agree	High
4. I value sharing of ideas.	3.92	0.88	Agree	High
5. I find group learning easier than individual learning.	3.87	0.85	Agree	High
6. I am willing to work in a group than working individually.	4.06	0.90	Agree	High
7. I believe in the saying that "two heads are better than one".	3.80	0.81	Agree	High
8. I like to explore things with my groupmates than working alone.	4.16	0.93	Agree	High
9. I am part of a goal-oriented group.	3.88	0.86	Agree	High
10.I felt happy about the success of the group as a whole.	4.31	0.96	Strongly Agree	Very High
Overall	**4.02**	**0.89**	**Agree**	**High**

Collaborative Learning scale taken from Cagatan and Quirap (2024).

Appendix 4: Factor Matrix

Factor Matrix for CL Scale

	Factor Loading 1
I like to explore things with my groupmates than working alone	.939
I find myself productive learning with my groupmates than learning alone	.924
I find group learning easier than individual learning	.891
I am part of a goal-oriented group	.861
I am willing to work in a group than working individually	.850
Asking questions with my groupmates is helpful	.832
I believe in the saying that "two heads are better than one"	.827
I felt happy about the success of the group as a whole	.813
I am confident working in groups than working alone	.806
I value sharing of ideas	.727

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 4 iterations required.

Factor Matrix For SE Scale

	Factor Loading	
	1	2
I can solve most problems if I invest the necessary effort	.816	
No matter what comes my way, I am usually able to handle it	.816	-.320
I can always manage to solve difficult problems if I try hard enough	.749	
If someone opposes me, I can find means and ways to get what I want	.748	
When I am confronted with a problem, I can usually find several solutions	.714	
Thanks to my resourcefulness, I know how to handle unforeseen situations	.681	.545

If I am in a bird, I can usually think of something to do	.591	
I can remain calm when facing difficulties because I can rely on my coping abilities	.549	
It is easy for me to stick to my aims and accomplish my goals	.521	
I am confident that I could deal efficiently with unexpected events	.499	.569

Extraction Method: Principal Axis Factoring.
a. 2 factors extracted. 14 iterations required.