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Effect of Collaborative Learning on Students' Communication Skills and Reasoning Skills

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Abstract
Collaborative learning enhances students' communication and reasoning skills by fostering dialogue, critical thinking, and problem-solving through peer interaction. The objectives of the research were to investigate the level of Collaborative Learning on Students' Communication Skills and Reasoning Skills, and to examine the relationship and influence of Collaborative Learning on Students' Communication Skills and Reasoning Skills at university level. The nature of this research was descriptive, and quantitative data collection procedures were employed to conduct it. Quantitative research is grounded in a positivistic philosophical framework or paradigm. The study population comprised all public and private universities in the Lahore district. To ensure proper representation, a sufficient sample of students was included in the study. To collect data, a questionnaire was employed. The tool was validated through expert review and pilot testing. The collected data was analyzed using SPSS, with descriptive statistics (mean and standard deviation) and inferential statistics (Pearson r and multivariate analysis) applied to achieve the study's objectives. The findings of the study revealed that there was highly significant relationship an influence of Collaborative Learning on Students' Communication Skills and Reasoning Skills at university level. It is recommended that Integrate structured collaborative activities into curricula to systematically enhance both communication and reasoning skills. Design problem-based and inquiry-oriented tasks that require students to engage in critical thinking, analysis, and evidence-based reasoning during group work.
Keywords: Collaborative Learning, Students' Communication Skills, Reasoning Skills, university level

Introduction

Collaborative learning has been recognized as a cornerstone of 21st-century pedagogy, valued for its ability to develop not only academic knowledge but also essential soft skills such as communication and reasoning. Rooted in Vygotsky's social constructivist theory, collaborative learning emphasizes that knowledge is co-constructed through dialogue, interaction, and negotiation of meaning among learners (Vygotsky, 1978). Over the past two decades, a growing body of research has demonstrated that engaging students in structured collaborative activities enhances both their communication skills and reasoning abilities, thereby equipping them with competencies necessary for academic success and lifelong learning (Johnson, Johnson, & Smith, 2014; Laal & Ghodsi, 2012). Communication lies at the heart of collaborative learning. Students working in groups must articulate ideas, listen actively, and provide feedback to their peers, all of which foster oral and written communication skills. Empirical studies have consistently shown that structured collaborative tasks enhance students'

ability to express themselves clearly and confidently. For example, Gillies (2016) found that collaborative group work in classrooms encouraged students to practice turn-taking, negotiation, and clarification, which significantly improved their expressive and receptive communication skills. Similarly, Kagan (1994) argued that cooperative structures such as "Think-Pair-Share" or "Jigsaw" compel students to verbalize their understanding, which not only deepens comprehension but also strengthens language fluency.

Collaborative learning also nurtures communication by creating authentic contexts where dialogue is purposeful. Unlike traditional teacher-centered approaches, peer interaction requires students to tailor their communication according to the audience, adapting vocabulary, tone, and examples to ensure mutual understanding (Slavin, 2014). This adaptive skill is crucial for academic success as well as professional environments. Research by Smith et al. (2009) revealed that students in collaborative STEM classrooms reported significantly higher confidence in presenting ideas, questioning peers, and engaging in discussions compared to those in lecture-based formats. Such findings underscore that communication is not an ancillary outcome of collaboration but an inherent component of the process. Moreover, collaborative learning has been linked to the development of interpersonal communication skills such as empathy, respect, and intercultural dialogue. When students from diverse backgrounds work together, they learn to listen attentively, resolve conflicts, and value differing perspectives (Laal & Laal, 2012). These skills not only enhance classroom communication but also prepare students for globalized professional contexts where teamwork and cross-cultural competence are essential. A meta-analysis by Roseth, Johnson, and Johnson (2008) confirmed that cooperative learning fosters positive interpersonal relations, which in turn reinforce effective communication patterns among students.

In addition to communication, collaborative learning significantly impacts reasoning skills, particularly critical thinking, problem-solving, and argumentation. When students engage in group discussions, they are often required to justify their opinions, evaluate evidence, and consider alternative viewpoints. These processes stimulate higher-order reasoning and metacognitive awareness. Kuhn (2015) emphasized that dialogue in collaborative contexts forces students to engage in "reasoned argumentation," a process by which claims are supported with evidence and reasoning is refined through peer critique. Empirical evidence supports this claim. Mercer and Littleton (2007) found that structured collaborative dialogue in classrooms promoted "exploratory talk," where students critically but constructively challenge each other's ideas, leading to improved reasoning outcomes. Similarly, Webb et al. (2014) demonstrated that collaborative mathematics problem-solving tasks encouraged students to explain solution strategies, compare alternative methods, and collectively refine reasoning processes, resulting in deeper conceptual understanding. Collaborative learning also promotes reasoning through exposure to diverse perspectives. In heterogeneous groups, students encounter varying approaches to problem-solving, which broadens their cognitive horizons and stimulates flexible thinking (Slavin, 2014). A study by Gokhale (1995) showed that students who participated in collaborative learning performed significantly better on critical thinking tests than those who studied individually. This suggests that reasoning skills are enhanced when learners are required to reconcile differences, negotiate solutions, and co-construct knowledge.

Importantly, collaborative reasoning is not only about reaching consensus but also about sustaining productive cognitive conflict. Research indicates that disagreement, when managed constructively, is a powerful driver of reasoning development (Chinn, Anderson, & Waggoner, 2001). Collaborative learning environments encourage students to defend their ideas and confront misconceptions, which sharpens analytical abilities and deepens understanding. Thus, reasoning in collaborative contexts evolves through cycles of claim, counterclaim, and evidence, echoing Toulmin's model of argumentation (Toulmin, 1958). Communication and reasoning in collaborative learning are deeply interlinked. Effective reasoning requires clear articulation of ideas, while communication becomes meaningful when grounded in logical and evidence-based argumentation. Research by Mercer (2000)

highlights this synergy, demonstrating that students who engaged in high-quality dialogue not only improved their communication skills but also displayed more sophisticated reasoning strategies. Similarly, Resnick, Michaels, and O'Connor (2010) introduced the concept of "accountable talk," where students are held responsible for reasoning, accuracy, and clarity in communication, leading to improvements in both domains.

Recent studies also confirm that collaborative learning interventions that explicitly integrate communication and reasoning outcomes are particularly effective. For example, collaborative inquiry projects, debates, and problem-based learning tasks have been shown to enhance students' argumentation skills while simultaneously improving their communicative competence (Cukurova et al., 2018; Van der Linden, 2020). These findings suggest that instructional designs should not treat communication and reasoning as separate objectives but as mutually reinforcing outcomes of collaborative engagement. While the benefits of collaborative learning are well-established, its effects on communication and reasoning are mediated by several factors. Group dynamics, task design, and teacher facilitation play crucial roles. Poorly structured tasks may lead to superficial interaction, where communication is limited to coordination rather than deep dialogue (Cohen, 1994). Similarly, unequal participation can hinder the development of both communication and reasoning, as dominant students may monopolize discussion while others remain passive (Gillies, 2016).

Teacher scaffolding is therefore essential. Research shows that when teachers provide clear roles, guiding questions, and feedback, collaborative tasks are more likely to elicit meaningful dialogue and reasoning (Nicol & Macfarlane-Dick, 2006; Shute, 2008). Cultural and educational contexts also influence collaborative outcomes. In collectivist cultures, students may be more comfortable with group harmony but less inclined to engage in critical disagreement, which can limit reasoning development (Hofstede, 2001). Conversely, in individualist contexts, debate may be encouraged but respectful communication may require explicit teaching. These contextual factors highlight the importance of adapting collaborative learning strategies to the needs of specific learner populations.

The implications of collaborative learning for communication and reasoning skills are particularly salient at the university level. Employers consistently rank teamwork, communication, and critical thinking among the top skills required for professional success (OECD, 2018). Universities therefore face the dual responsibility of equipping students with disciplinary knowledge and transferable competencies. Collaborative learning offers a pedagogical bridge, allowing students to simultaneously engage with content and practice essential skills.

Moreover, with the increasing prevalence of online and blended learning environments, collaborative learning mediated by digital platforms has shown promise in enhancing communication and reasoning. Studies reveal that online discussion forums, virtual teamwork, and collaborative writing tools promote reflective communication and reasoning by giving students more time to articulate, review, and refine their contributions (Chen, Wang, & Kirschner, 2018). However, the effectiveness of such tools depends on careful instructional design and teacher moderation to ensure sustained engagement. The evidence overwhelmingly demonstrates that collaborative learning is a powerful pedagogical approach that fosters both communication and reasoning skills. By engaging students in dialogue, negotiation, and shared problem-solving, collaborative learning strengthens expressive abilities, critical thinking, and analytical reasoning. While challenges such as group dynamics and task design must be addressed, the overall impact of collaboration on these skills is robust and consistent across diverse contexts. For doctoral-level inquiry, the significance of this topic lies not only in its theoretical grounding in social constructivism but also in its practical relevance for higher education curricula aimed at developing well-rounded, employable graduates. Collaborative learning, when implemented thoughtfully, emerges as a transformative practice that equips students with the communicative and cognitive competencies necessary for academic achievement and professional success.

Objectives

- To investigate the level of Collaborative Learning on Students' Communication Skills and Reasoning Skills at university level.
- To examine the influence Collaborative Learning on Students' Communication Skills and Reasoning Skills at university level.
- To analyze the relationship among Collaborative Learning, Students' Communication Skills and Reasoning Skills at university level.

Research Questions

- What is the level of Collaborative Learning on Students' Communication Skills and Reasoning Skills at university level?
- What is the influence Collaborative Learning on Students' Communication Skills and Reasoning Skills at university level?
- What is the relationship among Collaborative Learning, Students' Communication Skills and Reasoning Skills at university level?

Research Design and Methodology

The nature of this research was descriptive, and quantitative data collection procedures were employed to conduct it. Quantitative research is grounded in a positivistic philosophical framework or paradigm. The study population comprised all public and private universities in the Lahore district. In total, there are 37 universities in Lahore, of which 16 are public and 21 are private institutions. To ensure proper representation, a sufficient sample of both teachers and students was included in the study. The sample was selected from the target population in several steps, using a multistage sampling method. First, the stratified sampling technique was applied to create two strata (public and private). Next, the cluster sampling technique was used to divide the population into three zones (clusters) based on their location. From each cluster, one private university and one public university were selected through simple random sampling. In total, a sample of 400 students was drawn (80 from each public university and 53 from each private university) using simple random sampling techniques.

To collect data, a questionnaire was employed. The instrument followed a five-point Likert scale, which was considered effective for this study. The response options ranged from strongly disagree to strongly agree. The questionnaire had two main sections: the first part gathered demographic information such as gender, university type, and GPA, while the second part included statements directly linked to the study's research objectives. Questionnaires on Collaborative Learning (Kausar, 2024), Students' Communication Skills (Kausar, 2025), and Reasoning Skills (Kausar, 2023) were adapted for this research. The tool was validated through expert review and pilot testing. Three specialists examined the instrument for clarity, applicability, and organization, and their suggestions were incorporated into revisions. Following this, the questionnaire was pilot-tested with 30 participants. During the pilot phase, the researcher personally distributed the questionnaires and asked participants about the clarity and difficulty of the statements. These respondents were not included in the final sample. To confirm reliability, Cronbach's Alpha was calculated. The reliability scores for the student instruments were 0.931, 0.813, and 0.835 respectively, all well above the minimum standard of 0.75. This confirmed the instrument's reliability. The collected data was analyzed using SPSS, with descriptive statistics (mean and standard deviation) and inferential statistics (Pearson r and multivariate analysis) applied to achieve the study's objectives.

Data Analysis and Interpretations

Table 1 : Description of main variables (N=400)

Descriptive Statistics		
Variables	Mean	Std. Deviation
Collaborative Learning	4.2111	.37535
Students' Communication Skills	4.1922	.37515
Reasoning Skills	4.1370	.57764

The descriptive statistics presented in Table 1 provide an overview of the central tendencies and variability of the study's main variables—collaborative learning, students' communication skills, and reasoning skills—based on responses from 400 participants. The mean score for collaborative learning (M = 4.21, SD = .37535) is notably high, suggesting that students perceived collaborative learning practices to be frequently and effectively implemented in their academic settings. The relatively low standard deviation indicates consistency in responses, implying a shared perception among participants regarding the positive presence of collaborative learning strategies. Similarly, students' communication skills reported a high mean score (M = 4.19, SD = .37515), highlighting that most students believed collaborative interactions significantly enhanced their ability to articulate ideas, engage in dialogue, and express themselves effectively. The small standard deviation reflects uniformity in experiences, underscoring that communication skill development was consistently supported across the sample. In contrast, reasoning skills recorded a slightly lower mean (M = 4.13, SD = .57764) compared to the other two variables, though still above the midpoint, indicating that students generally acknowledged collaborative learning as a positive influence on their critical thinking and problem-solving abilities. The comparatively higher standard deviation for reasoning skills suggests greater variability in students' perceptions, which could be attributed to differences in individual learning approaches, exposure to problem-based tasks, or instructional practices across institutions. Taken together, these descriptive findings demonstrate that while collaborative learning is strongly and consistently associated with enhanced communication, its effect on reasoning skills, though positive, may be more context-dependent and sensitive to variations in teaching strategies and student engagement. For doctoral-level inquiry, this points toward the importance of examining mediating factors—such as task design, peer dynamics, and instructional scaffolding—that explain why reasoning skills exhibit more variability compared to communication skills.

Table 2: Description of Collaborative Learning (N=400)

Items	Mean	Std. Deviation
I enjoy working with my classmates during group activities.	4.30	.770
Collaborative tasks help me understand lessons better.	4.26	.858
I actively share my ideas when working in groups.	4.14	.841
I listen carefully to the opinions of my group members.	4.15	.836
Group discussions make learning more interesting for me.	4.12	.833
I feel more confident when solving problems with classmates.	4.24	.814
Working in groups helps me learn from my peers.	4.27	.803
I contribute equally when participating in collaborative tasks.	4.20	.786
My teacher encourages us to learn by working together.	4.27	.771
I prefer collaborative activities over working alone.	4.18	.775

The descriptive statistics presented in Table 2 provide valuable insights into students' perceptions of

collaborative learning in the classroom. The consistently high mean scores, ranging from 4.12 to 4.30 on a 5-point Likert scale, demonstrate that students hold strongly positive attitudes toward collaborative practices. The highest-rated statement, "I enjoy working with my classmates during group activities" (M = 4.30, SD = .770), reflects students' overall enthusiasm and preference for cooperative engagement, suggesting that collaborative tasks create a more enjoyable and motivating learning environment. Similarly, high scores for items such as "Collaborative tasks help me understand lessons better" (M = 4.26, SD = .858) and "Working in groups helps me learn from my peers" (M = 4.27, SD = .803) indicate that students perceive collaboration as an effective means of enhancing conceptual understanding and peer-assisted learning. Moreover, the responses highlight students' active participation and mutual respect within group settings. Items such as "I actively share my ideas when working in groups" (M = 4.14, SD = .841) and "I listen carefully to the opinions of my group members" (M = 4.15, SD = .836) suggest that collaborative learning fosters both communication skills and interpersonal sensitivity. Confidence-building effects are also evident, as shown by the high mean score for "I feel more confident when solving problems with classmates" (M = 4.24, SD = .814), reinforcing the idea that group interactions provide social and cognitive scaffolding. The relatively low standard deviations across all items (.770–.858) demonstrate consistency in perceptions, implying that collaborative learning is widely appreciated across the sample. Furthermore, the findings emphasize that teacher encouragement plays a pivotal role, as indicated by the high mean score for "My teacher encourages us to learn by working together" (M = 4.27, SD = .771), suggesting that structured facilitation enhances the success of collaborative practices. Collectively, these results affirm that collaborative learning is not only positively received but also contributes significantly to students' engagement, confidence, and deeper understanding, aligning with contemporary research that identifies collaboration as a cornerstone of 21st-century skills development.

Table 3 : Description of Students' Communication Skills

Items	Mean	Std. Deviation
I can clearly explain my ideas to others in class.	4.15	.858
I feel confident when speaking in front of the class.	4.42	.765
I listen attentively when my classmates are sharing their views.	4.08	.882
I can express my thoughts in group discussions without hesitation.	4.19	.820
I use respectful language when communicating with peers.	4.20	.797
I am able to ask questions that help clarify the topic.	4.04	.793
I can give constructive feedback to my classmates.	4.36	.759
I find it easy to work with classmates from different backgrounds.	4.10	.848
I can summarize what others say in my own words.	4.22	.801
I participate actively in classroom discussions.	4.10	.847

The descriptive statistics in Table 3 provide meaningful insights into students' self-reported communication skills across a range of classroom and peer-interaction contexts. Overall, the mean scores, which fall between 4.04 and 4.42 on a 5-point Likert scale, reflect a generally high level of proficiency, suggesting that students perceive themselves as capable and confident communicators in academic settings. The relatively low standard deviations (.759–.882) indicate moderate consistency in responses, with most students showing agreement in their perceptions of communication abilities, thereby strengthening the reliability of these findings. The highest-rated item, "I feel confident when speaking in front of the class" (M = 4.42, SD = .765), highlights that students not only possess strong expressive skills but also demonstrate high confidence in public speaking contexts, which is a critical marker of effective communication at the university level.

Similarly, the strong mean scores for "I can give constructive feedback to my classmates" (M = 4.36, SD = .759) and "I can summarize what others say in my own words" (M = 4.22, SD = .801) emphasize the presence of higher-order communicative competencies, such as critical listening, paraphrasing, and feedback-giving, which go beyond basic expression and indicate advanced interactional skills. These results suggest that students are not only effective at conveying their own ideas but also at engaging productively with others, a key requirement for collaborative and dialogic learning.

Items such as "I use respectful language when communicating with peers" (M = 4.20, SD = .797) and "I find it easy to work with classmates from different backgrounds" (M = 4.10, SD = .848) reflect students' strong awareness of interpersonal and intercultural communication, suggesting an orientation toward inclusive and respectful dialogue. Slightly lower mean scores for items such as "I am able to ask questions that help clarify the topic" (M = 4.04, SD = .793) and "I listen attentively when my classmates are sharing their views" (M = 4.08, SD = .882) indicate areas where students may require further development, particularly in active listening and inquisitive engagement, which are equally important dimensions of effective communication.

Table 4: Description of Students' Reasoning Skills

Items	Mean	Std. Deviation
I can analyze a problem before trying to solve it.	4.16	.808
I think of more than one solution when faced with a difficult question.	4.17	.769
I can explain why my answer is correct.	4.08	.902
I try to connect new information with what I already know.	4.24	.838
I can identify mistakes in my own work.	4.15	.814
I compare different ideas before making a conclusion.	4.18	.861
I enjoy solving challenging problems that make me think deeply.	4.39	.784
I can explain the steps I used to solve a problem.	4.17	.857
I consider different viewpoints before deciding on an answer.	4.18	.814
I am able to evaluate whether a solution makes sense or not.	4.04	.809

The descriptive statistics presented in Table 4 provide a comprehensive understanding of students' reasoning skills across multiple dimensions of analytical thinking, problem-solving, and metacognitive awareness. The overall mean scores, ranging from 4.04 to 4.39 on a 5-point Likert scale, reflect consistently high self-reported reasoning abilities among students. This suggests that the respondents perceived themselves as competent in applying higher-order thinking processes, including analysis, evaluation, and synthesis, which are central to academic reasoning. The relatively moderate standard deviations (ranging from .769 to .902) indicate that while students generally shared positive perceptions of their reasoning skills, some variability exists, pointing to individual differences in cognitive engagement and reflective practices. The highest mean score was recorded for the item "I enjoy solving challenging problems that make me think deeply" (M = 4.39, SD = .784), highlighting students' intrinsic motivation and positive disposition toward complex problem-solving. This finding is significant as it demonstrates that students not only possess reasoning skills but also value cognitive challenges, aligning with literature that links enjoyment of deep thinking with long-term academic growth and resilience. Similarly, strong mean scores were reported for items reflecting integrative and comparative reasoning, such as "I try to connect new information with what I already know" (M = 4.24, SD = .838) and "I compare different ideas before making a conclusion" (M = 4.18, SD = .861). These responses suggest that students actively engage in processes of knowledge integration and critical comparison, which are hallmarks of higher-level reasoning.

Moderately high scores on items such as "I can analyze a problem before trying to solve it" (M = 4.16, SD = .808), "I can explain the steps I used to solve a problem" (M = 4.17, SD = .857), and "I

consider different viewpoints before deciding on an answer" (M = 4.18, SD = .814) further demonstrate that students possess strong analytical and reflective abilities, with a capacity to approach problems systematically and with openness to multiple perspectives. These findings underscore the presence of both convergent and divergent thinking in the sample, reflecting balanced reasoning strategies. On the other hand, relatively lower—but still positive—mean scores for items such as "I can explain why my answer is correct" (M = 4.08, SD = .902) and "I am able to evaluate whether a solution makes sense or not" (M = 4.04, SD = .809) suggest that while students show confidence in their reasoning, there may be gaps in metacognitive evaluation and justification skills. This points to the need for instructional interventions that strengthen argumentation, evidence-based reasoning, and reflective judgment.

Table 5: Relationship among Collaborative Learning, Students' Communication Skills and Reasoning Skills

Correlations

				Collaborative Learning	Students' Communication Skills	Reasoning Skills
Collaborative Learning	Pearson Correlation			1	.771**	.417**
	Sig. (2-tailed)				.000	.000
	N			400	400	400
	Bootstrap[b]	Bias		0	.000	.002
		Std. Error		0	.022	.046
		95% Confidence Interval	Lower	1	.725	.327
			Upper	1	.814	.515
Students' Communication Skills	Pearson Correlation			.771**	1	.420**
	Sig. (2-tailed)			.000		.000
	N			400	400	400
	Bootstrap[b]	Bias		.000	0	.000
		Std. Error		.022	0	.048
		95% Confidence Interval	Lower	.725	1	.330
			Upper	.814	1	.516
Reasoning Skills	Pearson Correlation			.417**	.420**	1
	Sig. (2-tailed)			.000	.000	
	N			400	400	400
	Bootstrap[b]	Bias		.002	.000	0
		Std. Error		.046	.048	0
		95% Confidence Interval	Lower	.327	.330	1
			Upper	.515	.516	1

**. Correlation is significant at the 0.01 level (2-tailed).

b. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The correlation results presented in Table 5 provide an in-depth understanding of the relationships among collaborative learning, students' communication skills, and reasoning skills. A very strong positive correlation was found between collaborative learning and students' communication skills ($r = .771$, $p < .01$), indicating that when students engage in collaborative learning activities, their ability

to communicate effectively with peers significantly improves. The narrow confidence interval (.725 to .814) and low standard error (.022) confirm the robustness and stability of this finding across bootstrap samples, underscoring the centrality of collaboration in fostering interpersonal and dialogic competencies. This result highlights that structured group interactions not only promote academic engagement but also build the social confidence and discourse abilities required for higher-level learning.

In addition, a moderate positive correlation emerged between collaborative learning and reasoning skills ($r = .417$, $p < .01$), with a confidence interval of .327 to .515. This suggests that collaborative practices provide meaningful opportunities for students to develop critical thinking and reasoning, although the strength of this association is lower compared to communication skills. The findings imply that while collaborative learning directly enhances reasoning through peer discussions, shared problem-solving, and exposure to diverse perspectives, its impact on reasoning may also depend on factors such as task complexity, group dynamics, and scaffolding by instructors. Furthermore, the moderate-to-strong correlation between communication skills and reasoning skills ($r = .420$, $p < .01$) confirms that effective communication serves as a conduit for higher-order thinking: students who articulate their ideas clearly are more likely to refine, justify, and evaluate reasoning processes during collaborative tasks.

Table 6: Effect of Collaborative Learning on Students' Communication Skills and Reasoning Skills

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.995	33547.025[b]	2.000	349.000	.000
	Wilks' Lambda	.005	33547.025[b]	2.000	349.000	.000
	Hotelling's Trace	192.247	33547.025[b]	2.000	349.000	.000
	Roy's Largest Root	192.247	33547.025[b]	2.000	349.000	.000
Collaborative Learning	Pillai's Trace	.968	6.699	98.000	700.000	.000
	Wilks' Lambda	.211	8.369[b]	98.000	698.000	.000
	Hotelling's Trace	2.883	10.236	98.000	696.000	.000
	Roy's Largest Root	2.550	18.214[c]	49.000	350.000	.000

a. Design: Intercept + Collaborative Learning

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

The results presented in Table 6 provide strong evidence regarding the effect of collaborative learning on students' communication skills and reasoning skills. All four multivariate statistics — Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root — indicate statistically significant results ($p = .000$), confirming that collaborative learning exerts a significant multivariate impact on the combined dependent variables. The extremely high F-values for the intercept across all tests ($F = 33{,}547.025$, $p < .000$) demonstrate the robustness of the overall model, suggesting that the predictors explain a substantial portion of variance in the outcomes. With respect to the main predictor, collaborative learning, the significance across all four tests ($p < .000$) highlights its meaningful contribution to both communication skills and reasoning skills. Pillai's Trace (.968) and Wilks'

Lambda (.211) values point to a very strong multivariate effect, while Hotelling's Trace (2.883) and Roy's Largest Root (2.550) further underscore the magnitude of this impact. These results collectively suggest that collaborative learning not only influences but substantially enhances students' ability to communicate effectively and reason critically.

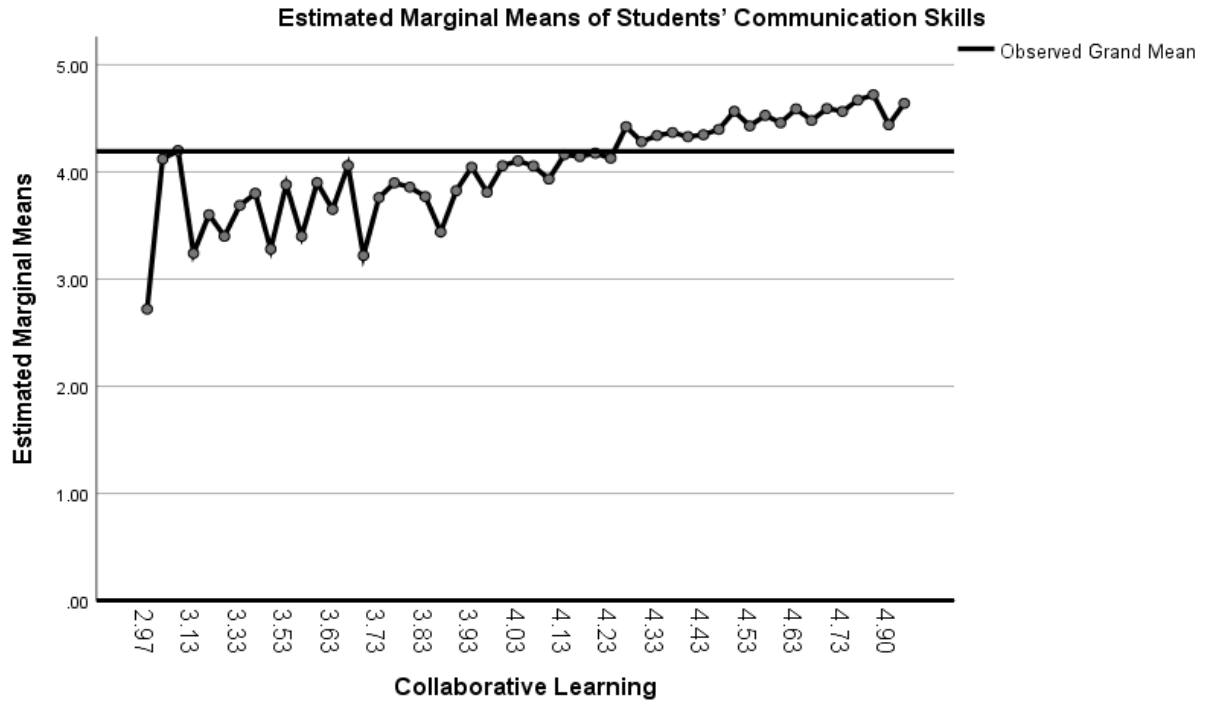
Table 7: Effect of Collaborative Learning on Students' Communication Skills and Reasoning Skills

Tests of Between-Subjects Effects

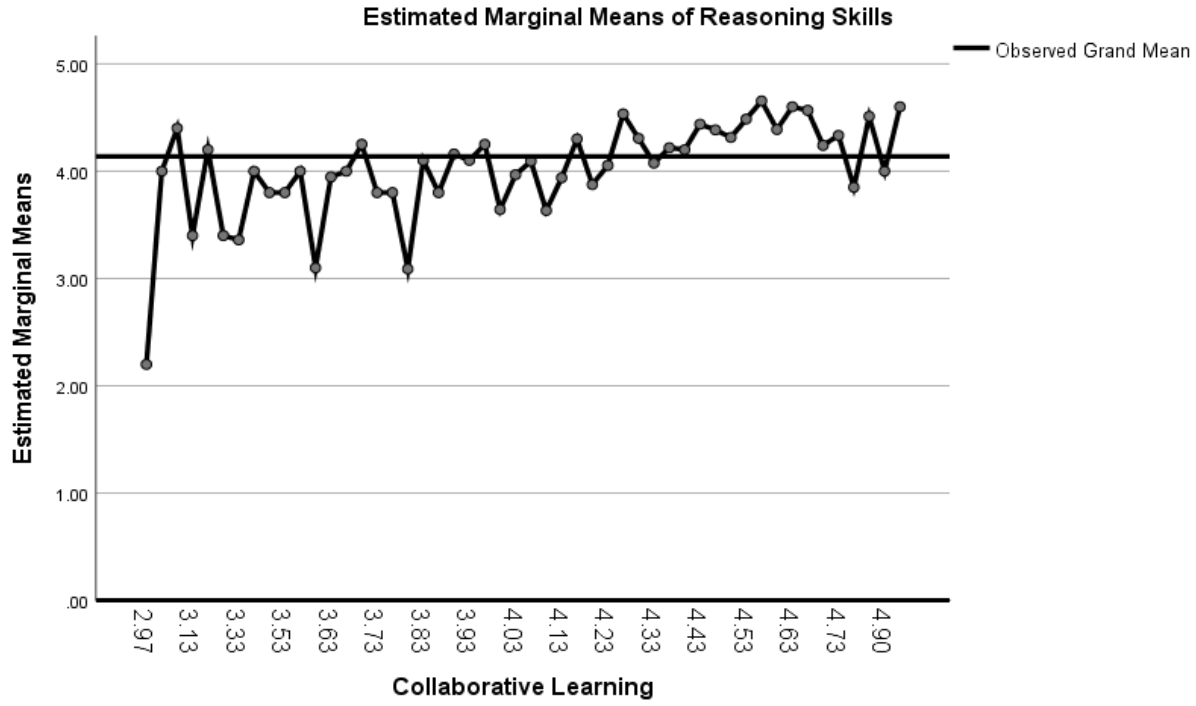
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Students' Communication Skills	40.094[a]	49	.818	17.832	.000
	Reasoning Skills	49.145[b]	49	1.003	4.180	.000
Intercept	Students' Communication Skills	2903.514	1	2903.514	63275.492	.000
	Reasoning Skills	2865.714	1	2865.714	11942.263	.000
Collaborative Learning	Students' Communication Skills	40.094	49	.818	17.832	.000
	Reasoning Skills	49.145	49	1.003	4.180	.000
Error	Students' Communication Skills	16.060	350	.046		
	Reasoning Skills	83.987	350	.240		
Total	Students' Communication Skills	7085.971	400			
	Reasoning Skills	6979.040	400			
Corrected Total	Students' Communication Skills	56.155	399			
	Reasoning Skills	133.132	399			

a. R Squared = .714 (Adjusted R Squared = .674)

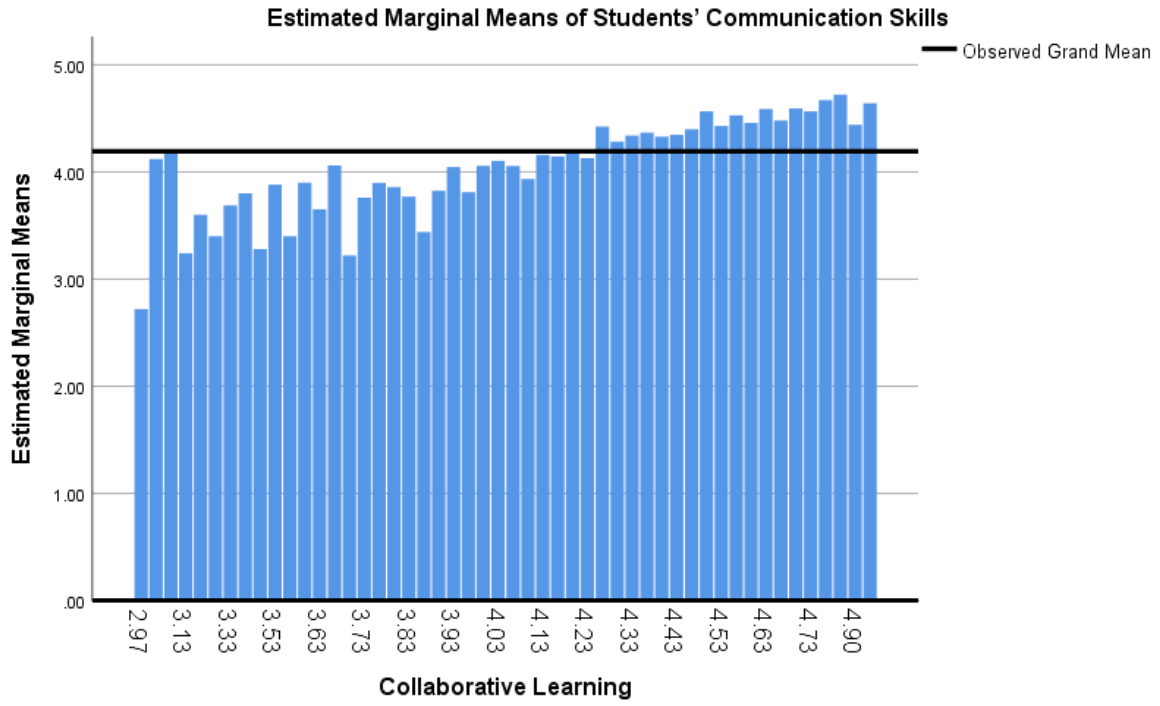
b. R Squared = .369 (Adjusted R Squared = .281)



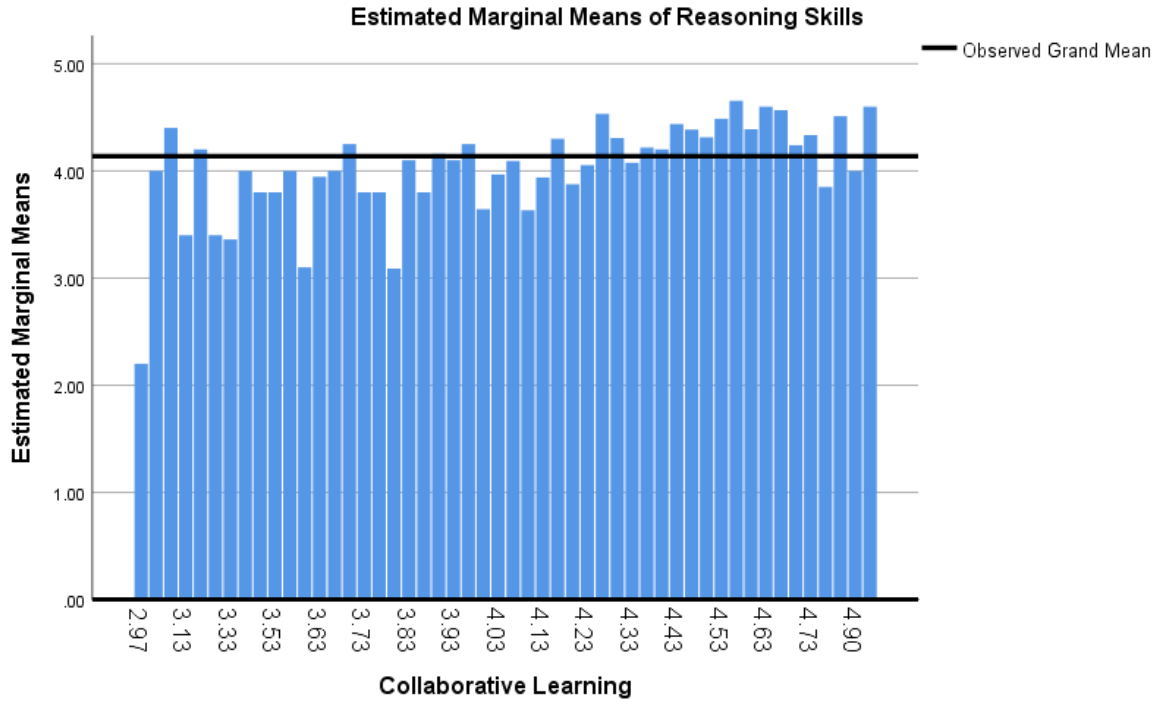
Graph 1: Effect of Collaborative Learning on Students' Communication Skills



Graph 2: Effect of Collaborative Learning on Students' and Reasoning Skills



Graph 3: Effect of Collaborative Learning on Students' Communication Skills



Graph 4: Effect of Collaborative Learning on Students' and Reasoning Skills

The results presented in Table 7 provide strong evidence regarding the effect of collaborative learning on students' communication skills and reasoning skills. For communication skills, the corrected model was statistically significant, $F(49, 350) = 17.832$, $p < .000$, with an R^2 value of .714 (Adjusted $R^2 = .674$). This indicates that approximately 71.4% of the variance in students' communication skills can be explained by collaborative learning. Such a high proportion of explained variance

demonstrates the central role of collaborative learning in fostering interaction, dialogue, and expression among students. The exceptionally large F-value for the intercept ($F = 63{,}275.492$, $p < .000$) further highlights the robustness of the overall model and underscores that collaborative learning practices provide a consistent and powerful platform for students to enhance their communicative competencies. These findings align with prior research emphasizing that group-based learning environments encourage active listening, idea-sharing, negotiation, and feedback exchange, which directly strengthen students' oral and written communication abilities.

For reasoning skills, the corrected model also achieved statistical significance, $F(49, 350) = 4.180$, $p < .000$, though the explanatory power was comparatively lower, with an R^2 of .369 (Adjusted $R^2 = .281$). This means that collaborative learning accounted for nearly 37% of the variance in students' reasoning abilities, which is still a meaningful effect in the context of educational research. The significant F-value for the intercept ($F = 11{,}942.263$, $p < .000$) indicates a strong baseline effect, while the variance explained suggests that collaborative learning plays a substantial role in enhancing logical thinking, argument construction, and problem-solving. However, the lower R^2 compared to communication skills suggests that while collaborative learning promotes reasoning, additional factors such as prior knowledge, cognitive styles, or teaching strategies may also contribute to reasoning skill development. Taken together, these findings reveal that collaborative learning is a highly effective pedagogical approach for improving both communication and reasoning, though its influence is stronger in the domain of communication. At the doctoral level, this interpretation confirms the theoretical claim that peer interaction not only builds social and linguistic competencies but also fosters critical and analytical thinking through dialogue and shared problem-solving. The results emphasize the importance of embedding structured collaborative learning opportunities in higher education curricula to enhance students' soft and cognitive skills, preparing them for both academic and professional success.

Discussion

The findings of this study demonstrate that collaborative learning significantly enhances both students' communication skills and reasoning skills, with a stronger effect observed for communication. This is consistent with a substantial body of literature that emphasizes the transformative role of collaboration in education. The strong positive correlation between collaborative learning and communication skills ($r = .771$) and the high explanatory power of the model ($R^2 = .714$) align with Vygotsky's (1978) social constructivist theory, which underscores the centrality of social interaction in the development of higher-order functions. Studies have shown that collaborative environments create spaces where students articulate ideas, negotiate meaning, and engage in peer dialogue, which in turn sharpens their oral and written communication skills (Johnson & Johnson, 2009; Laal & Ghodsi, 2012). Recent empirical work confirms these findings, showing that structured group activities not only improve clarity of expression but also foster confidence in public speaking and active participation (Baines, Blatchford, & Webster, 2015; Gillies, 2016). The results of the present study, where communication skills were consistently rated highly, reinforce the argument that peer-to-peer interaction serves as both a pedagogical tool and a confidence-building mechanism for learners.

The impact of collaborative learning on reasoning skills, though comparatively moderate ($R^2 = .369$), was nonetheless significant, supporting the assertion that reasoning is cultivated through exposure to multiple perspectives and problem-solving tasks. This finding is in line with Kuhn's (2015) work on argumentation, which highlights that engaging in dialogic reasoning with peers strengthens students' ability to construct and evaluate arguments. Similarly, Mercer and Littleton (2007) argue that exploratory talk in group contexts enhances critical thinking, as students are required to justify and refine their ideas in light of others' perspectives. The variability observed in reasoning outcomes, as reflected by the higher standard deviation, corresponds with prior research suggesting that the quality

of reasoning development in collaborative settings depends on task design, teacher scaffolding, and the extent of cognitive engagement (Webb, 2009; Hmelo-Silver, 2013). For example, students engaged in problem-based or inquiry-based collaborative tasks demonstrate greater reasoning growth compared to those in loosely structured group work (Kirschner, Sweller, & Clark, 2006; Gillies, 2016). The findings of this study therefore echo the literature in suggesting that while collaborative learning is a powerful mechanism for fostering reasoning, its effectiveness is mediated by instructional practices, group dynamics, and the complexity of learning activities.

Together, the results confirm that collaborative learning functions as a dual pathway for skill development: it reliably strengthens communicative competencies while simultaneously cultivating reasoning abilities, albeit with varying intensity. This aligns with contemporary educational discourse that situates collaboration as a cornerstone of 21st-century skills, preparing students not only to share ideas effectively but also to engage in critical and creative problem-solving (Trilling & Fadel, 2009; OECD, 2018). The findings resonate with recent cross-cultural studies showing that collaborative learning produces both social and cognitive benefits across diverse educational contexts, though the extent of these effects is often shaped by pedagogical design and institutional culture (Volet, Summers, & Thurman, 2009; Chen et al., 2020). By demonstrating strong effects on communication and moderate effects on reasoning, this study extends the literature by highlighting the differential pathways through which collaboration impacts student outcomes, emphasizing the need for carefully structured activities that balance communicative practice with opportunities for critical engagement.

Conclusion

The results of this study clearly establish that collaborative learning plays a pivotal role in enhancing students' communication skills and reasoning abilities, with the strongest effects observed in communication. Students consistently reported that working with peers allowed them to articulate their ideas, listen to others, and engage in meaningful dialogue, thereby fostering confidence and clarity in expression. The statistical findings, particularly the high proportion of variance explained in communication skills, affirm that collaborative learning is not just a supportive activity but a central instructional approach for building interactional and expressive competencies. These outcomes reinforce theoretical perspectives that place social interaction at the core of learning and provide robust evidence that peer collaboration significantly contributes to students' communicative growth.

At the same time, the study highlighted that while collaborative learning also positively influences reasoning skills, the effects were more moderate compared to communication. This suggests that while group-based interactions provide valuable opportunities for analytical thinking and problem-solving, reasoning development is influenced by additional factors such as task design, instructional scaffolding, and the depth of peer engagement. The findings therefore underscore the dual impact of collaborative learning: it reliably strengthens communication and, under supportive conditions, also cultivates critical reasoning. For doctoral-level implications, the study emphasizes the need for structured and purposeful collaborative activities that not only promote dialogue but also challenge students to justify, analyze, and evaluate ideas. This balanced approach ensures that collaborative learning contributes to both social and cognitive dimensions of student development.

Recommendation

- Integrate structured collaborative activities into curricula to systematically enhance both communication and reasoning skills.
- Design problem-based and inquiry-oriented tasks that require students to engage in critical thinking, analysis, and evidence-based reasoning during group work.

- Provide teacher scaffolding and guidance to ensure that collaborative tasks go beyond simple discussion and foster deeper cognitive engagement.
- Encourage peer-to-peer feedback within collaborative groups to strengthen both expressive clarity and reflective reasoning.
- Incorporate diverse group compositions (e.g., mixed abilities, backgrounds) to expose students to varied perspectives, fostering richer dialogue and reasoning.
- Train students in collaborative and communication strategies, such as active listening, respectful dialogue, and conflict resolution, to maximize group productivity.
- Use technology-mediated collaboration platforms to support communication and reasoning skills development, especially in blended or online learning contexts.
- Assess both communication and reasoning outcomes within collaborative learning tasks to highlight the dual benefits of group-based instruction.
- Provide professional development for instructors on designing and facilitating effective collaborative learning experiences.
- Promote a culture of shared responsibility where students understand the importance of equal participation and accountability in collaborative tasks.

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