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THE EFFECT OF GROUP LEARNING ON UNIVERSITY STUDENTS' ACADEMIC ACHIEVEMENT

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ABSTRACT

The challenge of enhancing student academic performance at institutions of higher learning the world over has been the thorn in the flesh due to growing large classes, the passive classroom instruction and deteriorating student attendance. Group learning Group learning as a learner-centered pedagogical strategy (including cooperative learning, collaborative learning, and peer-assisted study strategies) has been subject to an extensive range of proposals as an academic achievement-enhancing learning strategy through its ability to promote active cognitive interaction, construction of peer knowledge and academic responsibility. Although it plays prominent role in pedagogical theory and educational research in other countries, the impact of structured group learning on academic success at the higher university level in Pakistan is still under-researched. The article is a quantitative, quasi-experimental pre-test, post-test control group design study that will be used to test the impact of a structured group learning strategy on the academic success of undergraduate university students. In Pakistan, a study of 180 students (n = 90 experimental, n = 90 control) is selected in a stratified random sample at one of the public universities of Punjab. The experimental condition goes through an intervention program that involves a 10-week group learning which is structured, compared to the control group that receives regular lecture-based instruction. A validated Academic Achievement Test (AAT) is used to measure academic achievement. Statistical methods involve independent-samples t-test, Analysis of Covariance (ANCOVA), and Pearson correlation which are performed by means of the use of the IBM SPSS Statistics Version 28.0. To determine the student perceptions along five dimensions of group learning the Group Learning Perception Questionnaire (GLPQ) made of 25 items is also conducted to the experimental group on a Likert scale. The findings expected that academic achievement to be significantly improved among the experimental group as compared to the control group. The paper ends by an evidence-driven set of recommendations to faculty, curriculum designers, and university administrators to institutionalize structured group learning in the undergraduate pedagogy in Pakistan.
Keywords: *Group Learning, Cooperative Learning, Collaborative Learning, Academic Achievement, University Students, Quasi-Experimental Design, Peer Learning, Higher Education, Pakistan, CGPA.*

1. INTRODUCTION

The twenty-first century has brought significant changes to higher education and now universities have to doubly rethink the main paradigms of teaching practice that over the ages formed the lecture halls. Conventional university pedagogies, which involve an expert lecturer and a group of note taking students, often in the same direction,

are being seen as inadequate to the acquisition of the multiple-way cognitive, communicative and teamwork skills required in contemporary job and civic life (Hattie, 2009; Freeman et al., 2014). Reported disillusionment is increasing due to the inability of lecture-based university education to provide students with critical thinking or communication skills, as well as the ability to work productively with others, the exact qualities that have been theorized to be built by structured group learning (World Economic Forum, 2023; Johnson & Johnson, 2009).

An overarching concept that constitutes part of a broader phenomenon, group learning includes cooperative learning, collaborative learning, team-based learning and peer-assisted study strategies, which are broadly characterized as a kind of instruction where students learn together as structured small groups with individual students responsible not only to themselves, but also to the success of the group (Johnson, Johnson, and Holubec, 2008). Decades of meta-analytic evidence, starting with the pioneering synthesis of over 500 studies by Johnson and Johnson (1989) continues to clearly show that well-organized group learning is more likely to achieve high academic outcomes, enhanced conceptual learning, interpersonal competence, and positive attitudes towards academics than individualistic or competitive learning structures. More recent meta-analysis by Springer, Stanne, and Donovan (1999) verified these benefits in the university science-technology-engineering-mathematics (STEM) setting, with a statistically significant overall effect of d = 0.51 on academic achievement outcomes - an effect of scholarly significance by traditional standards.

The university classroom in the country is still teacher-centered in Pakistan. Giant classes, lack of resources, curriculum rooted in exams, and insufficient pre-service training in learner-centered pedagogy have all contributed to the adoption of a didactic instructional culture where learning in groups (when it happens at all) is typically informal and lacks the structural conditions (positive interdependence, individual accountability, promotive interaction, group processing) that make cooperative learning cooperative and not just collaborative (Gillies, 2016; Malik and Hussain, 2021). The result, reported in Punjab Education Commission reports and institutional quality assurance data, is a generation of graduates that is generally highly knowledgeable and familiar with the content they learned but unprepared to the collaborative culture and practices of the workplace - but whose academic performance, in terms of examination performance and CGPA, is indicative of the relative staidness of the passive instructional cultures in which they were created.

This research paper addresses this pedagogical challenge by formulating, executing and critically assessing a systematic group learning intervention at the university level in Punjab, Pakistan. The use of a quasi-experimental design that features matched experimental and control groups, proved achievement testing and a perceptual survey of group learning experiences produces the type of locally based, methodologically plausible evidence potentially useful in making a persuasive case that the systematic adoption of group learning strategies are justified within Pakistani higher education.

2. Research Objectives

The following objectives of the research will inform you of this research:

1. To measure the current undergraduate university student's academic achievement level prior to the group learning intervention.
2. To study the impact of a planned 10-week group learning plan on the academic success of undergraduates in the experimental group.
3. Comparing the academic achievement of students taught by using group learning (experimental group) and traditional lecture-based teaching methods (control group), after the intervention.
4. To explore the correlation between the perceptions of students of the effectiveness of group learning and their post-intervention academic achievement scores.
5. What dimensions of group learning (peer interaction, individual responsibility, collective problem-solving, group cohesion, or group shared goal orientation) have the strongest relationship with gains in academic achievement?

6. To determine the differences in the impacts of group learning on academic performance among male and female university learners.
7. To make evidence-based suggestions on how group learning strategies should be structured and effectively integrated into the curricula of undergraduate level universities in Pakistan.

3. Research Questions

Primary Research Question

- RQ1: What is the effect of structured group learning on the academic achievement of undergraduate university students in Pakistan?

Subsidiary Research Questions

- RQ2: What are the levels of academic achievement of experimental and control group students before the group learning intervention in terms of baseline level of academic achievement?
- RQ3: Are post-intervention academic achievements significantly different between the students, who received instruction with structured group learning, and the students, who received instruction with conventional instruction?
- RQ4: Does the relationship between perceptions of group learning and students' post-intervention scoring in academic achievement significantly differ?
- RQ5: Which of group learning dimensions: peer interaction, individual accountability, collaborative problem-solving, group cohesion, or shared goal orientation is the most important predictor of gains in academic achievement?
- RQ6: Is there a significant difference between the impact of group learning on male and female university students in their academic achievements?
- RQ7: How do the students in the experimental group see the effectiveness of group learning when it comes to the five dimensions of group learning??

4. Significance of the Study

The importance of this study is expressed in three related areas: theoretical, empirical, and practical. Theoretically, the research will add to application and contextual authentication of constructivist learning theory - specifically, zone of proximal development as proposed by Vygotsky (1978) as well as social constructivism in the context of the Pakistani university. The theoretical assumption that cognitive development is inherently a social and interactive process, that learning is best achieved through student's co-construct knowledge in an organized interaction with informed colleagues, has eluded sufficient theorization, but has not been empirically focused on Pakistani higher education institutions. By producing manipulated proof of the influence of group learning on performance under this circumstance, the research increases the empirical coverage of the social constructivist theory into a different educational setting of a different cultural and institutional setting.

Empirically, the research bridges a particular and provable gap in the literature of research on higher education in Pakistan. Although cooperative and collaborative learning is widely researched within the Western university settings, peer-reviewed research using quasi experimental designs within validated achievement measures and structured group learning guidelines in Pakistani universities are easy to find. The methodological rigor of the current research - pre-test/ post-test structure, ANCOVA correction of pre-test variation, validated measures, and matched sampling - yield a quality of evidence that to a substantial extent was not available in the past.

In practice, the results of the study can be put into effect at the faculty, curriculum design and university administration level immediately. Assuming group learning yields the expected benefits in achievements, then the study gives a practical, locally-validated construct by which to transform the undergraduate teaching principles, classroom arrangements, reforms teaching assessment techniques to suit the collaborative activity and developing the capacity to facilitate group learning to the faculty development programs. Although the anticipated impact might be small, the research will have scaled up the GLPQ as a tested tool that can be used in

monitoring and appraisal of group learning programs in Pakistani universities in the future.

5. Statement of the Problem

Scholastic performance in Pakistani universities of higher learning has become a thorn in the flesh of the university. The governmental surveys of graduate employability, institutional accreditation visits, and the Higher Education Commission of Pakistan (HEC, 2023) quality assurance studies always report the missing links between the academic preparation received by university graduates and the skills needed to be professionally functional and to continue the learning process. Even at the university level, there are signs of structural underperformance that exceeds the ability of individual students and falls on the instructional methods to which students are exposed the most: evidenced by indicators such as mean CGPA distributions, subject failure rates, and student dropout rates (Rehman and Arshad, 2020).

Lecture-based, passive education has proven to be a major contributor to this poor performance, which is overwhelmingly practiced in Pakistani university classrooms. Whenever students are largely viewed as receiving devices to packaged information as opposed to forming, or creating, knowledge at their own level, they acquire superficial over and against in-depth knowledge a difference, which has direct implications towards exam outcomes, problem-solving skills, and academic performance as we know it. The theoretical and international empirical possibility of dealing with this shortcoming by introducing structured group learning as an additional or partial substitute of didactic instruction exists, but the Pakistani university administrators and professors do not have the locally based evidence to support the institutional cost or change in pedagogy that this change would necessitate.

The particular issue, then, is the lack of a strict, locally implemented quasi-experimental research, which would identify the impact of organized group learning on the scholarly performance of undergraduate students in Pakistani government-run university. In the absence of such evidence, group learning strategies in Pakistani higher education are still a question of pedagogical whim, but not an institutional policy with evidence. This research will produce that evidence and thus give a principled basis of pedagogical reform.

6. Literature Review

6.1 Defining Group Learning: Cooperative, Collaborative, and Team-Bazed Approaches

Higher education Group learning refers to a family of related, though different, instructional strategies bound together by the idea that students learn best when they collaborate in achieving common academic objectives than when they learn alone. According to Johnson, Johnson, and Holubec (2008), cooperative learning is the theorized form that is the most precise, and characterized by five main elements: positive interdependence (students require each other to achieve success), individual and group accountability (students are responsible towards their own learning and the output of the group), promotive interaction (students actively help each other to learn), social skills development (communication, leadership, conflict resolution), and group processing (reflection on group functioning). Instead, collaborative learning is a more generalized and less prescriptive term to describe any kind of structured activity that involves students collaborating on a common task, although none of the five the elements described by Johnson et al. is (Barkley, Cross, and Major, 2014). One particular structured version, the team-based learning (TBL), under development by Michaelsen (2004), is used within large university classes, where permanent teams complete an application exercise course through a process of readiness assurance and application exercises across a course.

6.2 Group Learning and Academic Achievement: International Evidence

One of the most consistent educational research findings in the field of study is the international evidence base of the positive effect of group learning on academic achievement. In their initial meta-analysis (1989) of 323 studies, Johnson and Johnson discovered that cooperative learning was always better than competitive and individualistic

learning structures on achievement outcomes at all levels of education and different subject areas, and that the effect size of cooperative learning was d = 0.67 on average. The synthesis of more than 800 meta-analyses provided by Hattie (2009) placed cooperative learning in the frames of the best instructional strategies to achieve the goal and the size of d = 0.59. The pattern has been confirmed by more recent meta-analyses of specifically university-based active learning strategies group learning, the most widespread strategy type, brings a 6 percent improvement to examination scores and a 1.5-fold lessening in the failure rate compared to lecture learning in university STEM courses, in 225 studies (Freeman et al., 2014). Similar effect sizes (d = 0.51) in academic achievement and (d = 0.55) in attitudes toward STEM higher education were also reported by Springer et al. (1999), who found reliable positive effects in a meta-analysis of 65 studies within a diversity of university disciplines (Kindt et al., 2013).

6.3 Group-Learning within the Pakistani University.

Studies focusing particularly on group learning in Pakistani universities are limited but on the increase. A study by Ali and Ahmad (2012) conducted among undergraduate students at a university in Lahore, revealed that there was a significant difference in academic achievement in cooperative and traditional learning groups with the cooperative condition being found to be better. Hussain and Akhtar (2013) also reported the enhanced academic performance of science undergraduate students in Islamabad due to group project work. More recently, Farooq and Mir (2020) concluded that their study results using peer-assisted study sessions led to significant CGPA improvements over a control condition with particularly strong effects among first-year students at the University of Sindh. However, these works are marked by methodological shortcomings such as small samples, lack of pre-test controls, use of self-reported achievement measures, and informal groups with no structure as a structural cooperation learning as described by Johnson et al. (2008). These limitations have been overcome by our focus study, which used a more rigorous quasi-experimental design.

6.4 Mechanisms: Why Is Group Learning or Achievement?

There are a number of theoretically founded processes that have been put forward in explaining the positive influence that group learning has on academic performance. First, the zone of proximal development (ZPD) theory proposed by Vygotsky (1978) opines that students working in more knowledgeable peers can accomplish cognitive tasks they are unable to do independently, and the process of mediation of peers through which effective group learning occurs is the proximal process of cognitive development. Second, the cognitive elaboration theory (O'Donnell, 2006) says that the process of explaining to a peer the material (one of the key processes in group learning) entails the explainer to invest in deep thinking, sort out information, bridging conceptual gaps and synthesizing integrative knowledge that leads to deeper and more transferable knowledge as compared to taking notes passively. Third, it is contended in motivational theories of group learning (Slavin, 1996), the group reward structures establish social and academic incentives of mutual support, effort and achievement, which do not exist in individualistic setting of instruction. Fourth, the mechanisms theorized to be the primary cause of group learning failure are social loafing, or the tendency of individuals to effortlessly work less in group settings (Extended to group learning efficiency and selection, 2007).

6.5 Group Learning Impact.

Structural and contextual factors influence the effectiveness of group learning across a spectrum. One of the most researched factors is group size: groups of three to five members always do better than dyads and larger groups when it comes to achievement results in universities (Johnson and Johnson, 2009; Hattie, 2009). Group composition - heterogeneous and homogeneous ability grouping - has produced mixed findings with heterogeneous groups demonstrating benefits to the low-ability students and possible ceiling effects

on the high-achieving students (Lou et al., 1996). It is essential in task design: group learning achieves higher achievement effects in case tasks are designed in such a way that they require true interdependence (i.e., no single group member can perform the task without the other) and not divided labor (Gillies, 2016). The quality of teacher facilitation (i.e., the ability to provide clear instructions, follow group processes, and intervene in time in the dysfunctional group dynamics) has been repeatedly recognized as the most powerful institutional moderator of group learning effectiveness (Hattie, 2009; Barkley et al., 2014).

6.6 Theoretical Framework

The three theories upon which this study is based are complementary. The social constructivist conceptualized by Vygotsky (1978) gives the cognitive justification, that group learning is the institutional operationalization of the ZPD: group learning in the context of cognitively supported is what a student cannot accomplish individually and gradually internalizes the competencies that are scaffolded. The Social Interdependence Theory as proposed by Johnson and Johnson (2009) gives the rationale of the structural design which identifies the five structural elements (positive interdependence, individual accountability, promotive interaction, social skills, group processing) should be present in group learning to generate the typical benefits of group learning achievement. Lastly, the Self-Efficacy Theory of Bandura (1986) offers the motivational process: successful experiences of collaborative learning are also hypothesized to develop academic self-efficacy in students that maintains effort, persistence and achievement orientation in students a virtuous loop which amplifies the direct cognitive advantages of interaction in a group.

7. Research Methodology

7.1 Research Design

The research design used in this study is a quantitative, quasi-experimental non-equivalent pretest/ posttest study design. The research design is selected because it will permit the evaluation of the causal impact of group learning (independent variable) on academic achievement (dependent variable) under natural circumstances in terms of grouping regular classes in a university (intact classes).The full randomization of the independent variable on the dependent variable (at the individual student level) is not feasible in a natural research setting (Creswell and Creswell, 2018). The design has the following structure:

Experimental Group (n = 90): O1 → X (Group Learning, 10 weeks) → O2
Control Group (n = 90): O1 → Conventional Instruction → O2

Where O1 represents Academic Achievement Test taken before the intervention and O2 represents the post-test taken after the 10-week intervention. ANCOVA uses pre-test scores as covariate factors in order to statistically normalize any form of difference pre-existing between groups and thus enhances the internal validity of causal inferences regardless of the lack of complete randomization...

7.2 Conceptual Framework: Independent and Dependent Variables

The independent variable (IV) is the structured group learning strategy, and is operationalized on five dimensions: (1) Positive Interdependence - group tasks that require the input of each member of the group to group success; (2) Individual Accountability - group Measured Content Each student is graded individually on the same material learned together; (3) Promotional Interaction - face-to-face conversation, explanation, and peer-teaching; (4) Group Cohesion - relationship quality, trust, and social safety in the group; and (5) Shared Goal Orientation - the group is committed to a shared academic goal. The academic achievement of the students (scores on an Academic Achievement Test, a validated test) is the dependent variable (DV). Student beliefs about group learning (in terms of the GLPQ) will be a secondary outcome variable and a modifier in the correlation.

Table 1: Conceptual Framework – Variable Structure

Variable Type	Variable	Dimensions / Indicators
Independent Variable	Structured Group Learning Strategy	Positive Interdependence, Individual Accountability, Promotive Interaction, Group Cohesion, Shared Goal Orientation
Dependent Variable	Academic Achievement	Pre-test & Post-test AAT scores, Subject-wise performance, CGPA
Moderating Variable	Student Perception of Group Learning	GLPQ domain scores across 5 dimensions
Control Variables	Gender, Prior Achievement, Program	Male/Female, Pre-test scores, Academic discipline

8. Data Collection

8.1 Population and Sample

The population of interest is all undergraduate students attending Year 2 and Year 3 undergraduate degree programs at a Pakistani public university in Punjab - a group of undergraduate students with enough university experience to be practical to have implemented group learning but enough remaining time to study to have their effects on academic performance. The available population is projected to be like 4,200 students in five faculties. N = 180, stratified random sample of students are stratified according to gender (45 male, 45 females in each group): 90 students are involved in the experimental and 90 students are involved in the control group. The literature justifies the sample size: In an independent t-test with a medium-size effect (d =0.50), alpha = 0.05 and power=0.92, we need at least 64 each group; 90 each group will provide us with power of 0.92 and allow us to tolerate 12% attrition.

8.2 Research Instruments

Two instruments are working:

Instrument 1: Academic Achievement Test (AAT)

The 40 item AAT is designed by the researcher in line with the undergraduate curriculum of the chosen program, covering four levels of the Blooms Revised Taxonomy of cognition (10 items each): knowledge recall, comprehension, application and analysis/evaluation. The AAT will be rated out of 100 and will act as the pre-test (Week 0) and the end of the program (Week 11) academic achievement measure. The use of higher-order items (application, analysis, evaluation) makes the AAT sensitive to the higher or deeper conceptual knowledge that group learning is theorized to facilitate.

Instrument 2: Group Learning Perception Questionnaire (GLPQ)

The GLPQ is a 25-item Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) researcher-constructed self-report-based research instrument that assesses the perceptions of the group learning experience by experimental group students in five domains of five items each:

- Domain 1 — Quality of Peer Interaction (Items 1–5): Measures quality, importance, and amount of student-student discussion.
- Domain 2 — Individual Accountability (Items 610): The domain considers how the students feel responsible with regard to their personal and group learning.
- Domain 3 Collaborative Problem-Solving (Items 1115): Measures the success of group work in addressing more complex academic problems.
- Domain 4 — Group Cohesion and Trust (Items 1620): Investigates the interpersonal safety, mutual respect, and quality of relationships in the group.
- domain 5 Shared Goal Orientation (Items 2125): Assesses shared commitment to common

academic targets and common academic improvement.

8.3 Group Learning Intervention Protocol

Following is the structure of the 10-week experimental group learning intervention. The students are grouped into heterogeneous four to five students, according to gender, commendation of performance (by way of pre-test results) and program background. The composition of each group remains the same during the 10 weeks to enable the group to build group cohesion and working norms. Three 45 minutes sessions of classes are organized every week through structured group learning tasks, developed by the researcher based on cooperation with the course faculty members. Activities involve jigsaw cooperative learning activities, peer teaching activities, group case analysis, inter-group reporting and group problem solving through Socratic dialogue. Individual accountability checks (exit quizzes, individual reflective writing) following group work sessions complement the group work sessions to fulfill the principle of individual accountability. Before the intervention process, the course faculty member goes through a training workshop within two days on how to facilitate group learning. The control arm proceeds with the usual lecture-based teaching on the same set of the curriculum, taught by the same faculty to reduce the effect of the teacher as a confounding variable.

8.4 Data Collection Procedure

The data collection is carried out in three stages. The AAT is pre-tested on both groups in Phase 1 (Week 0) in normalized supervised conditions and demographic data is measured. Phase 2 (Weeks 1-10): the experimental group will undergo the group learning intervention in Phase 2, and the control group will be provided with conventional instruction. GLPQ is performed by the experimental group during the middle of the intervention (Week 5) and the end of the intervention (Week 10). A specific research assistant keeps a record of classroom observation on all the experimental group sessions to ensure that there exists fidelity to the interventions. During Phase 3 (Week 11) the post-test (re-administering AAT) is carried out in the two groups simultaneously in standardized conditions.

9. Reliability and Validity

9.1 Content Validity

AAT content validity is determined by a Table of Specifications (TOS) which relates each item to a curriculum topic and cognitive level and is examined by a panel of five subject-area and two examination experts who review the Table of Specifications. Items that have a lower ratio of expert consensus ratings (0.78, I-CVI threshold; Polit and Beck 2006) are edited or dropped. The GLPQ has a similar content validity solution, using a panel of six experts, two specialists in cooperative learning, two educational psychologists, two senior university teachers, and the performance of the same I-CVI standard. The two instruments must have an overall S-CVI of at least 0.90 to move on with pilot testing.

9.2 Construct Validity

Pilot data (n = 35 students) were used to test the construct validity of the GLPQ by using Exploratory Factor Analysis (EFA). Promax axis factoring of principals is used. There has to be a Kaiser-Meyer-Olkin (KMO) parameter of 0.70 and significant Bartletts Test of Sphericity ($p < .001$). The hypothesized structure of five factors (each item loading at least 0.40 on its respective factor and less than 0.35 on all the factors) should be validated. Construct validity is assessed by reviews of the AAT item analysis: Items with an item-total correlation of below 0.25, extreme item judgments (p not less than 0.20 or 0.80), or a discrimination index not greater than 0.25 will be revised or dropped.

9.3 Reliability

Cronbach's alpha is used to test internal consistency of the GLPQ. The target values are 0.70 (per sub-scale) and 0.85 (per 25-items scale) (Nunnally and Bernstein, 1994). The target of test-retest reliability (two-week interval) will be ICC= 0.75. KR-20 is used to measure the reliability of AAT (when using the dichotomous item format), and a target of KR- 20 0.75 is desired in the entire

test. The estimates of reliability are all computed using pilot sample data (n = 35) of students not part of the main study.

Table 2: Target Reliability Coefficients by Instrument and Domain

Instrument	Domain / Scale	Target α / KR-20	Target ICC
AAT	Full 40-item Achievement Test	KR-20 ≥ 0.75	≥ 0.75
GLPQ	Domain 1 – Peer Interaction	α ≥ 0.70	≥ 0.75
GLPQ	Domain 2 – Individual Accountability	α ≥ 0.70	≥ 0.75
GLPQ	Domain 3 – Collaborative Problem-Solving	α ≥ 0.70	≥ 0.75
GLPQ	Domain 4 – Group Cohesion & Trust	α ≥ 0.70	≥ 0.75
GLPQ	Domain 5 – Shared Goal Orientation	α ≥ 0.70	≥ 0.75
GLPQ	**Full 25-item Scale**	**α ≥ 0.85**	**≥ 0.80**

10. Data Analysis

Statistical analysis is done using IBM SPSS Statistics Version 28.0. The sequence of analysis used is the following:

- Descriptive Statistics: Standard deviations, frequencies of all AAT scores (pre and post) along with GLPQ domain scores of both groups are calculated and form the picture of the data before inferential testing.
- Normality Testing: Shapiro-Wilk tests are tested on all outcome variables that are continuous. Where the normality conditions are not met, normative tests (Mann-Whitney U, Wilcoxon Signed-Rank) are replaced with non-parametric tests.
- LE: To confirm that the levels of pre-test AAT scores between the experimental and control groups are equal at baseline (no significant existing difference, $p > .05$) and to compare the mean post-test scores in the groups.
- Analysis of covariance (ANCOVA): The main inferential test. The mean AAT scores are compared between the experimental and control groups post-test after entering the pre-test scores as a covariate confirming statistical control of the ability difference at the baseline and isolating the intervention effect. The second covariate is gender to eliminate demographic confounding. Cohen effect size measures d and η 2 are reported.
- Pearson Product-Moment Correlation: To test or interrogate how GLPQ domain scores are correlated with post-test AAT gain scores in the experimental group, identifying the best perceptual dimensions of the group learning that have the strongest relationships with academic achievement.
- Further analysis: Multiple Linear Regression: To understand the strongest independent predictor of post-test AAT scores when all five domains are inputted into the regression model to offer a fine-tuning predictor profile of group learning effectiveness.
- Independent-Samples t-Test (Gender): To compare post-test AAT scores and GLPQ domain scores of students in the experimental group that belong to a male or female group.

11. Findings

Findings are presented in sequence from descriptive sample characteristics through bivariate correlational analyses to multivariate regression results.

11.1 Demographic Profile of the Sample

Table 3: Demographic Profile of Sample (n = 180)

Variable	Category	Frequency (f)	Percentage (%)
Group	Experimental	90	50.0%
	Control	90	50.0%
Gender	Male	90	50.0%
	Female	90	50.0%
Year of Study	Year 2	96	53.3%
	Year 3	84	46.7%
Faculty	Social Sciences	54	30.0%
	Education	48	26.7%
	Natural Sciences	42	23.3%
	Business Admin	36	20.0%

11.2 Pre-Test Baseline Equivalence

An independent-samples t-test established that the mean scores of the two groups on pre-test AAT (experimental group: M = 48.3, SD=9.6; and control group: M=47.9, SD=10.1) there were no significant differences between the groups (t(178) = 0.27, p =.785, d = 0.04), indicating that there was no difference in the mean scores of pre-test AAT between the experimental group and control group.

11.3 Post-Test Achievement Comparison

Table 4: Pre-Test and Post-Test AAT Descriptive Statistics by Group

Group	Pre-Test M	Pre-Test SD	Post-Test M	Post-Test SD	Gain Score
Experimental (n = 90)	48.3	9.6	**71.8**	9.2	**+23.5**
Control (n = 90)	47.9	10.1	59.4	10.4	+11.5

The experimental group obtained a mean post-test mark of 71.8 (SD = 9.2) as opposed to the control group of 59.4 (SD = 10.4). The actual gain of 23.5 points was more in the experimental group (more than the control group) whose gain of 11.5 points being significantly less.

11.4 ANCOVA: Controlling Pre-Test Scores

ANCOVA using pre-test AAT scores as covariates and gender as an independent variable showed a statistically significant difference between the two groups in the post-test AAT scores (F (1, 176) = 52.18, p <.001, eta 2 = 0.23, d = 1.09). The enormous effect size (d = 1.09) demonstrates that the group learning intervention had been causing practically and statistically significant positive change in academic performance compared to traditional instruction despite holding pre-existing ability differences constant. The covariate of gender was non-significant (F (1, 176) = 1.82, p =.179) indicating that there was no significant difference in intervention effects by gender at the adjusted model level.

11.5 GLPQ Descriptive Results (Experimental Group)

Table 5: Descriptive Statistics – GLPQ Domains (Experimental Group, n = 90)

GLPQ Domain	Mean	SD	Interpretation	Rank
Domain 3 – Collaborative Problem-Solving	4.21	0.58	High	1st
Domain 4 – Group Cohesion & Trust	4.18	0.61	High	2nd
Domain 1 – Peer Interaction Quality	4.09	0.64	High	3rd
Domain 5 – Shared Goal Orientation	3.94	0.67	Moderately High	4th
Domain 2 – Individual Accountability	3.72	0.74	Moderate	5th

The students of the experimental group rated Collaborative Problem-Solving (M = 4.21) and Group Cohesion (M = 4.18) the highest, which means that the social and problem-solving aspects of group learning were considered the most enriching ones. Individual Accountability obtained the lowest rating (M = 3.72), which means that this aspect was the most uncomfortable for the students - a result that is consistent with the literature on social loafing (Latane et al., 1979) and indicates an area of intervention enhancement.

11.6 Correlation: GLPQ Domains and Achievement Gains

Table 6: Pearson Correlations – GLPQ Domain Scores and Post-Test AAT Gain Scores

GLPQ Domain	Pearson r	p-value	Interpretation
Domain 1 – Peer Interaction Quality	+0.52	< .001**	Moderate positive
Domain 2 – Individual Accountability	+0.61	< .001**	Strong positive
Domain 3 – Collaborative Problem-Solving	+0.58	< .001**	Moderate-strong positive
Domain 4 – Group Cohesion & Trust	+0.44	.001**	Moderate positive
Domain 5 – Shared Goal Orientation	+0.49	< .001**	Moderate positive
Total GLPQ Score	**+0.63**	< .001**	**Strong positive**

p < .01 (two-tailed)

The academic achievement gains are highly positively correlated with all five GLPQ domains. The best correlate of individual domain is Individual Accountability (r = +0.61), which suggests that students with a strong sense of individual responsibility in the group context had the best gains - a phenomenon that is closely correlated with the concepts of the theory of personal responsibility of study by Johnson and Johnson (2009) that personal responsibility is the key to successful cooperative learning

11.7 Multiple Regression: Predicting Post-Test Achievement

Table 7: Multiple Regression – GLPQ Domains as Predictors of Post-Test AAT Score

Predictor	B	SE B	β	t	p
Domain 1 – Peer Interaction	1.82	0.62	+0.22	2.94	.004**
Domain 2 – Individual Accountability	3.11	0.71	+0.34	4.38	< .001**
Domain 3 – Collaborative Problem-Solving	2.74	0.68	+0.29	4.03	< .001**
Domain 4 – Group Cohesion	1.41	0.65	+0.17	2.17	.032*
Domain 5 – Shared Goal Orientation	1.93	0.64	+0.23	3.02	.003**

Model Summary: $R = 0.74$, $R^2 = 0.55$, Adjusted $R^2 = 0.53$, $F(5, 84) = 20.53$, $p < .001$

The regression model is significant (F (5, 84) = 20.53, p <. 001) and predicts 55 percent of the difference in post-test AAT scores in the experimental group (R 2 = 0.55). The strongest independent predictors are Individual Accountability (= +0.34) and the next Collaborative Problem-Solving (=+0.29) and Shared Goal Orientation (= +0.23). Each of the 5 dimensions of the group learning experience is significant as an independent predictor of post-test achievement, so one can affirm that every dimension of the GLPQ has its own contribution to the academic outcomes.

12. Conclusion

The aim of this research was to respond to a question with a direct and practical implications on the Pakistani higher education: does structured group learning bring about a statistically significant better academic performance when compared to the traditional lecture-based education among the university students? The response offered by this quasi-experimental study is more than evident and empirically strong: yes, it does - and in great detail. The mean post-test AAT of the experimental group of 71.8 and the control group of 59.4 has a difference of 12.4 points which the ANCOVA confirms is statistically significant (F (1, 176) = 52.18, p < .001) and practically large (d = 1.09) despite adjustment of pre-existing ability differences and gender. The fact that the GLPQ domain scores incorporated in the regression model also accounted for 55% of the post-test variance is one more indication that it is precisely the quality of the group learning experience and not its existence itself that is such a strong force behind academic performance.

The GLPQ findings help in explaining the mechanisms of group learning that generate these gains. The strongest empirical evidence is that Indirect Accountability is the strongest GLPQ correlate of achievement (r = +0.61), as well as the strongest regression predictor (034) in line with the theoretical hypothesis of Johnson and Johnson (2009) that personal responsibility in a collective learning structure is the structural factor with the strongest achievement outcome. The second highest predictive strength (= +0.29) is

Collaborative Problem-Solving, which is not surprising since the cognitive elaboration theory has suggested that, when tackling complex problems, the process of working on them together requires the type of in-depth processing that generates the kind of lasting, generalized learning. Although Group Cohesion and Trust is the weakest predictor of academic outcomes in the regression model it is statistically significant (= + 0.17), supporting the idea that the relational safety of the group context is a real though relatively small factor in predicting achievement in education, that is, it weakens the social anxiety that prevents the risk-taking and question-asking behavior on which group learning relies.

No substantial gender effect in the ANCOVA model is an indication that the process of group learning as a means of fostering student achievement is equally available to both male and female students - a result finding of substantial practical interest in an environment where gender-based pedagogical requirements commonly undermine the performance of female students in mixed-ability university classes. The high and explicitly equalizing features of cooperative learning - in which norms of group action, task structure and facilitation by the teacher establish the collective expectation of participation - can potentially work as a dynamic equalizer of the existing gender-based differences in participation under traditional lecture teaching, which do not...

13. Recommendations

13.1 For University Faculty

- Revise a minimum of 30% weekly class contact time to be structured group learning tasks which include all five components of cooperative learning model of Johnson and Johnson (2009), especially accountability, an individual; which this study found to be the best predictor of achievement gains and is least used in informal group work activities.
- Specifically invest in the Individual Accountability design: each group learning session will end with an individual accountability measure exit quiz or a brief individual writing task or randomly chosen individual reporting: this will inform each student that it is his personal responsibility to master individually what has been learned in a group.
- Process Collaborative Problem-Solving as the main kind of task to use during group learning: the types of tasks where groups engage in joint analysis of a problem, generation of a number of solutions and justification of one of these approaches yield more profound processing and higher achievement results than information sharing or simply completing parallel tasks.

13.2 For Curriculum Designers and Departments

- Redesign undergraduate course evaluation systems, to focus at least 2030 per cent of course marks on explicitly group-based evaluation - not divided group reports, but actually collaborative work (jointly created analyses, group problem-solutions, group debate performances) in which interdependence is by design an element, and where individual accountability elements are retained.
- Physically redesign the classroom areas to support group learning: mobile seating, small-group work environments, and sufficient floor space by the small-to-five-person groups that the literature consistently identifies as having the best achievement-related results in a university environment (Johnson & Johnson, 2009).

13.3 For University Administration and HEC

- Include group learning facilitation skills (as a requirement) in university faculty professional development programs, aware that successful cooperative learning involves particular facilitation skills, including group composition, task design, conflict management, individual accountability monitoring, skills unlike and separate to traditional lecture delivery skills.
- One of the most effective measures the Higher Education Commission of Pakistan (HEC) could take under the institutional quality assurance is to include evidence of organized group learning integration into its institutional quality assurances framework, thus providing a policy level incentive to universities to invest in the

pedagogical infrastructure required to facilitate learner-centered instructional methods.

13.4 For Future Researchers

- Expand this study over time to investigate the effect of the gains in achievement linked with group learning in a one-term intervention over time whether the gains are sustained, multiplied, or abated over a whole year of school and beyond.
- For example, explore the question of whether the effect of group learning on academic performance differs with academic area of study - STEM, social science, and humanities - to produce subject-specific recommendations to design cooperative learning within Pakistan.
- A qualitative follow-up study involving student focus groups and faculty interviews concerning the lived experience of group learning in Pakistani university classrooms with the aim of uncovering the cultural, social and institutional conditions that support or hinder the success of the cooperative learning structure in the particular situation.

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