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Impact of Collaborative Group Work on Student Engagement: Results from An Intervention in Bangladesh College Education

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Abstract

This research is an empirical research question of the efficacy of Collaborative Group Work (CGW) as a transformative intervention to revive student engagement in s attached to the National University of Bangladesh. It deals with the pedagogical stasis of conventional, teacher-centered approaches that often result in the learner's disengagement. The mixed-methods design was used, which engaged a core sample of 80 undergraduate students in a 120-day longitudinal survey and in Focus Group Discussions (FGDs) with 40 participants. The measurements were quantified in ten dimensions. On the aggregate Active Engagement Score, the quantitative results showed statistically significant improvement ($Z = 3.18$, $p < 0.001$) that has a medium effect size (Cohen $d = 0.50$)5. The most practical influence was observed in the parameter of the teaching method, which had a $d = 0.61$ value and is an indicator of high student receptivity to active learning. Some of the benefits and systemic hindrances identified through the thematic analysis. CGW is an efficient tool of breaking hierarchical classroom settings and establishing a "Community of Practice" which minimizes the gap in engagement. It is proposed that the Professional Learning Communities (PLCs) should be institutionalized and mobile-friendly EdTech should be adopted.

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Introduction

Higher education is now moving in a significant global paradigm, that is, student-centered learning (SCL), instead of the old teacher-centered learning. This is particularly acute in Bangladesh since the tertiary sector tries to conform to international academic best practices. National University of Bangladesh, which is the main affiliating institution of both the government and non-government has traditionally been using a traditional mode of delivery, which has been described as lecture-based. Even while active learning has gained a lot of international acclaim, teacher-centered teaching methods that still predominate in these schools, where students

listen passively while the teacher delivers knowledge unilaterally, have generally not changed.

This teaching stasis is a direct contradiction to the Government of Bangladesh strategic vision. The National Education Policy-NEP (2010) also suggests a transition to interactive procedures to expand the creative powers and capabilities of the students. To fill this gap, the policy suggests the variety of the teaching strategies, including the group work, guided discussion, and project-based learning. However, there is no uniformity in the adoption of these requirements, and most teachers are not well conversant with new interactive practices.

Student engagement is the level of attention, interest and curiosity expressed by the learners which is closely associated with academic success. According to the existing sources, instructional methods are the most crucial in the establishment of interactive learning environments. In particular, Team-Based Learning (TBL) and the use of groups have proved to be effective methods of enhancing behavioral, emotional, and cognitive engagement. On the other hand, the disengagement of students is also a crisis that is reported in the Bangladesh setting. Cognitive disengagement is caused by boredom, and students often seek to engage with digital distractions or pay exclusive attention to memorizing by rote to avoid failing exams. Such a top-down system has placed the power of the teacher above the interest of the student, making the education process obsolete to the 21st century requirements.

In order to fill this pedagogical gap, this research employs mixed-method research design to assess the efficacy of Collaborative Group Work (CGW) as a transformational engagement technique. In the context of the National University, the study will answer the following four questions to determine the effectiveness of this intervention:

RQ1: What is the overall impact of collaborative group work intervention on the behavioral, cognitive, and affective patterns of engagement of students?

RQ2: What do students and teachers think about the perceived advantages and pedagogical downsides of the CGW intervention?

RQ3: What are the systemic and practical barriers to the transition from traditional lecturing methods of teaching to collaborative model of learning in the National University-affiliated s?

RQ4: What institutional facilities, professional development and curriculum changes are needed, based on empirical evidence, to maintain an active learning paradigm in the Bangladeshi context?

Review of Literature

The History of Student Engagement.

Student engagement is a complex concept, which is necessary to promote effective learning and quality education. Although this concept has been popularized in the mid-1990s, it is modeled after the Theory of Student Involvement proposed by Astin (1984), according to which students focus on the academic experience through the amount of physical and psychological energy they dedicate to it (Trowler, 2010). The initial measurement was more time on task with engagement being understood in the context of student conduct and procedural adherence (Brophy, 1983). However, a newer scholarship, first led by Kuh et al. (2007) described engagement in a much broader sense as where student efforts and institutional conditions intersect with outcomes that are directly measurable.

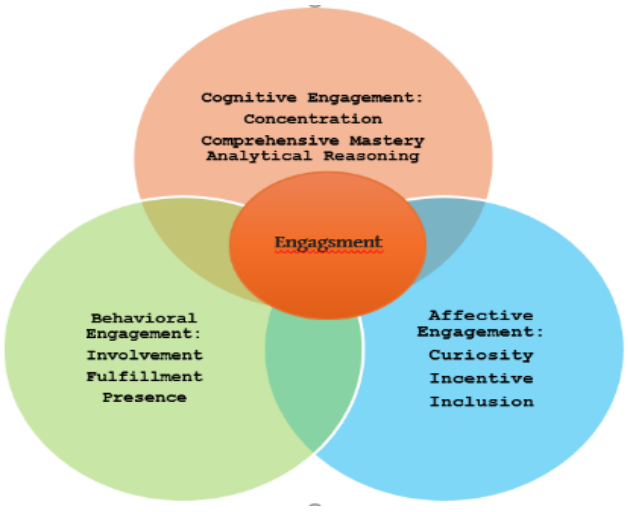

Fig.1: Dimensions of Student Engagement

The three dimensions of engagement seem to be most frequently identified by the contemporary frameworks: cognitive, behavioral, and affective (Handelsman et al., 2005).

These dimensions as synthesized by Chapman (2003) include the mental effort that goes into learning (cognitive), the level of involvement in activities (behavioral), and the way a student feels (affective).

To further refine this framework, Fredricks et al. (2004) pointed out that these dimensions should only be examined in a dynamic way but not on their own since they affect each other to form a comprehensive engagement picture. More recently, a fourth dimension has been hypothesized by Reeve and Tseng (2011) named Agentic Engagement, which describes the active contribution of students in the instructional flow, including posing questions or offering preferences. This addition is specifically applicable to a collaborative environment, where student agency is the key success factor.

Moreover, Kahu (2013) provided a socio-psychological viewpoint by stating that engagement is not a possession of the student, but the result of the interaction between the individual and the environment. This is corroborated by Zepke and Leach (2010), who opine that institutional culture and the teacher-student relations play most crucial role in transforming students who have only attended school to those with deep and intrinsic motivation. Through incorporating the two views, the research will be able to assess how interventions such as Collaborative Group Work (CGW) can destabilize hierarchies in traditional settings to create a higher-order interaction in various cultural settings.

Group Work (CGW) as a Pedagogical Strategy.

Collaborative Group Work (CGW) is a self-managed approach in which students discuss ideas and solve problems that are complex in nature in a social group (Rush and Balamoutsou, 2006). According to Mandernach (2015), a student who is engaged in collaborative learning should argue out ideas and learn to value different points of view and so the classroom should not be seen as a place of passive consumption, but as the active learning environment. This change lies firmly in the fact that according to Vygotsky (1978), students gain greater cognitive abilities when they have been put in the scaffolding of more, who is more capable, in accordance with the Zone of Proximal Development (ZPD).

Case after case of research points to the fact that collaborative models are better than individualistic or competitive models in learning. Johnson et al. (2006) carried out a review of 168 studies finding collaborative learning to contribute significantly to academic performance, reasoning and long-term retention in students. The latter is also backed by the contributions of Slavin (1995) who claimed that effective collaboration should have both group and individual responsibility whereby the success of the group relies on the learning process of each member.

Equally, meta-analysis of 39 STEM-oriented studies by Springer et al. (1999) included the finding that the small group interactions were associated with higher retention of knowledge and more favorable attitudes toward complex topics than the traditional lecture-based learning. To give the argument a more modern touch, in his synthesis of more than 800 meta-analyses, Hattie (2009) rated the peer-to-peer learning as a high-impact factor in influencing student achievement, with the result being an average impact of 0.5. Moreover, Kirschner et al. (2006) have offered a mental view point, in which collaborative setting may alleviate personal cognitive load, by sharing complex task-processing among many working memories in the group.

Lastly, Gillies (2003) pointed out that it is not enough to be in a close position with the students but the quality of the so-called exploratory talk and the guided interaction that can promote in-depth learning. Combining all these different viewpoints, the justification of CGW is no longer a mere classroom exercise, but rather a scientifically based need of higher education in the 21st century, especially where the goal is to go beyond memorization.

Collaboration Best Practices.

Collaborative Group Work (CGW) should be designed in such a way that positive interdependence and shared interests are the central features, which will guarantee that personal success is inextricably

connected to the success of the group (Brame & Biel, 2015). In literature, group composition is always considered an important success factor. The small groups (3-5 people) are usually more productive and easier to organize than larger group which can easily be affected by logistical hustle and social loafing (Jaques, 2000). In addition to size, Oakley et al. (2004) also indicate that groups formed by instructors, as opposed to student-selected groups, were more likely to be more effective in securing diversity and reducing the possibility of developing unproductive social groups.

Moreover, CGW implementation requires a paradigm shift on the role of instructor as one does not sit on the stage as the sage anymore but act as a guide or guide on the side. The shift entails making formative feedback during the process and not just at the end (Abadzi, 1985). Likewise, Tiberius (1990) underlined this proactive facilitation and said that an instructor should be active in making sure that group dynamics is monitored to avoid groupthink and to allow equal participation.

As a strategy to achieve high quality results, Johnson and Johnson (1999) considered that one of the best practices is group processing, that is, team members should think about their work process and reveal what behaviors are useful and what should be changed. This is complemented by Team-Based Learning (TBL) framework presented by Michaelsen (2002) that emphasized the need of significant tasks which are complicated to the extent that only a small group of students would not be able to solve the problem on their own. Lastly, Boud, Cohen, and Sampson (2001) emphasized the usefulness of so-called peer learning as a reciprocal process, pointing out that metacognitive awareness is the more students are made to elaborate their reasons to others. With these well-organized best practices, the teachers will be able to turn the group tasks into high-impact learning tasks that promote both the academic and the soft-skills.

Collaborative Learning Environment in Bangladesh.

Intervention-based research studies, in Bangladesh, have been focusing on the possibility of Collaborative Group Work (CGW) in breaking the pedagogic inertia, commonly typified by rote learning and teacher-centeredness. As revealed by Rahman et al. (2020), systematic group work and role-playing showed great benefits in terms of behavioral and cognitive engagement in a secondary school, so even in the case of strict curriculum, in which social interaction occurs infrequently, structure can help to encourage deeper learning. In the rural setting, Hossain and Akter (2021) applied a quasi-experimental design to demonstrate that cooperative learning enhanced emotional engagement and motivation in science education, which is why it is useful in resource-limited settings.

On the undergraduate level, Khan et al. (2022) discovered that business students engaged in group projects experienced more levels of efficacy in problem-solving and proactive cognitive reasoning, especially with the encouragement of a teacher. Sarkar et al. (2014) also contended that although the intention to use interactive pedagogy is great with the Bangladeshi students, washback effect of high stakes examination tends to inhibit full accomplishment of collaborative models.

Incorporating a regional dimension, Ahsan and Burnip (2007) found that a deficiency in teacher self-efficacy in group management tends to slow down the shift in inclusive and collaborative practices in Bangladesh. This is supported by the fact that Chowdhury (2014) argued that although the national education policy (2010) promotes creative and critical thinking, its application in the classroom still mostly is “traditional and transmission-oriented.

Moreover, Anwar and Sohail (2014) found in the similar South Asian backgrounds that collaborative learning may be the solution in closing the gap between theory and practice, as long as there is a cultural identification of a group activity with the social values of the students. Taken together these studies indicate that although the empirical evidence concerning CGW in Bangladesh has a strong positive picture, the implementation gap needs a systems level emphasis on teacher professional development and curriculum change to shift isolated interventions to an institutionalized practice.

Challenges and Situational Dilemmas

Although CGW has been proven to be effective, there are major systemic and cultural challenges in the implementation of this model in the Bangladeshi higher education sector. According to Islam et al. (2021), there is a three-fold barrier, including the deep-rooted teacher unwillingness to abandon the old-fashioned teaching methods based on lectures, the deficit of professional growth in the new teaching paradigm, and the geometric impossibility of being locked in poorly furnished and inflexible classrooms designed to provide passive learning. This is in accordance with Haider and Akhter (2012) who observed that the mean classroom size and student teacher ratio in Bangladesh provide a form of a crowding effect that renders the logistical management of small group virtually impossible without any expert training.

In addition to infrastructure, cultural variables are determinant factors of the effectiveness of collaborative models. According to Sultana (2020), gender roles and social hierarchies can unintentionally make group dynamics complicated when a group of students consists of silent voices: in most cases, it is female students or lower socio-economic backgrounds who are excluded even in a group. This is in line with culture dimensions theory proposed by Hofstede (2011), whereby in a culture that has a high-power distance such as Bangladesh, the student would not feel at ease questioning the teacher or even assume leadership positions in front of fellow students.

Moreover, Blatchford et al. (2003) opine that unless there is also relational training, students tend to revert to social loafing or free-rider effect whereby the workload is not fairly allocated. It is a tricky issue especially in exam-heavy assessment settings when students are more focused on procedural compliance (in order to get marks) than the substantive engagement needed to engage in deep learning (Zepke and Leach, 2010).

Lastly, Fullan (2007) maintains that the change in education is a process rather than an event; to effectively make collaborative learning in Bangladesh successful, researchers suggest that such situational factors can be mitigated by designing of infrastructure on a long-term basis and by providing continuous support to faculty. To move to a sustainable culture of active learning, there is a need to change the institutional culture of CGW as an extra-curricular activity to considering it an academic part of the curriculum (Biggs and Tang, 2011).

Theoretical Framework

This research is based on a multidimensional theoretical model of integrating social constructivism, principles of collaborative learning, and models of psychological engagement to examine pedagogical reform in the Bangladeshi setting. The theoretical underpinning to the CGW intervention is the following:

Collaborative Learning and Social Constructivism.

The Social Constructivism theory, developed by Vygotsky (1978) holds that knowledge is a social product that is built in a meaningful interaction. CGW enhances a discourse ambiance in the course of which opinion negotiation results in the joint development of novel thoughts. This is operationalized by Collaborative Learning Theory (Johnson & Johnson, 1999) where collaboration in learning is a main approach towards achieving the objectives of learning. The intervention is specifically useful in nurturing:

- Positive Interdependence: It is associated with the collective effort of the group.
- Personal responsibility: every student is held accountable to his /her own contribution.
- Peer Support: Interpersonal Intervention is the driver of cognitive development.

Engagement and Motivation Models.

The research deploys the Student Engagement Model (Fredricks et al., 2004) that explains engagement as a multidimensional concept that involves behavioral, affective, and cognitive dimensions. The group work is a major initiator, which activates all three dimensions simultaneously. This is also aided by the Self-Determination Theory (SDT) (Deci and Ryan, 1985) which asserts that there are three basic psychological needs of a student namely:

- Autonomy: Developing the feeling of owner-ship of the learning process.

- Competence: Gaining peer-reliance.
- Relatedness: Establishing belonging in the academic community.

The Cultural-Historical Activity Theory (CHAT)

The study uses Cultural-Historical Activity Theory (CHAT) in order to explain the particular institutional context of the National University-affiliated s in Bangladesh (Engeström, 1987). The CHAT provides an opportunity to analyze the systemic perspective of the transformation of pedagogical practices in the context of a traditional structure that is formed in culture, which reveals the contradictions between normative practices of lectures and the new models of collaborative work.

Theoretical Synthesis

All these theories imply that as long as students are put in a group environment, they fulfill their psychological needs (SDT) and subsequently the cognitive and behavior involvement (Engagement Model). In this perspective, social interaction and collective responsibility are complementary to each other in order to speed up the learning outcome in a particular cultural context of Bangladesh. These theories are interrelated as shown in Figure 2.

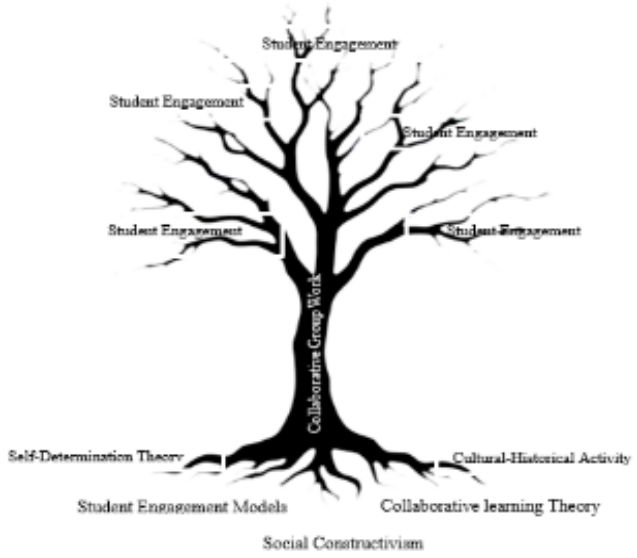

Fig.2: Theoretical Framework

Implementation of the Intervention.

The context and participants of the institution.

This research was carried out in [affiliated college], a prestigious postgraduate institution in Bangladesh. A Professional Learning Community (PLC) of four faculty members of different academic disciplines was created and implemented to design and execute the intervention. The population study was a random group of 200 first-year honors students in four majors: Political Science, Economics, Sociology, and Social Work.

Research Design and Timeline.

The shift in the student engagement levels was measured using a pre-post study design. The 120-day project was based on a five-stage plan.

Table 1: Project Timeline and Implementation Phases

Stage	Length	Key Activity
Preparation Stage	07 days	Development of standardized lesson plans, interactive tools, and pedagogical materials.
Baseline Assessment	07 days	Data collection via questionnaires to establish engagement levels in conventional lecture settings.
Intervention Practice	72 days	Execution of 10 Collaborative Group Work (CGW) classes per instructor across four disciplines.
Final Assessment	04 days	Post-intervention data collection using the same validated engagement questionnaires.
Reporting	30 days	Data triangulation, qualitative thematic analysis, and final manuscript preparation.

The 120-day intervention shown in the project schedule above was implemented in five strategic

steps with the main focus being put on the 72-day period of practice that would guarantee the immersion in pedagogical aspects.

The CGW Pedagogical Framework.

The intervention was systematic in the implementation of the Taxonomy of Bloom in order to achieve greater level of cognitive involvement. Key components included:

- Formal Lesson Planning: Teachers came up with lesson plans that included group projects, debates and simulations.
- Group Dynamics: Students were divided into small and heterogeneous groups of 3-5 students to guarantee a manageable coordination.
- Role Allocation: Each individual member was assigned specific roles and responsibility so that passive participation is minimal.
- Facilitation: The instructors were facilitators who behaved as instructors and made on-the-fly comments and created a judgment free space where students felt comfortable taking risks and being divergent thinkers.
- Tools and Materials: Interactive tools, such as whiteboards, sticky notes and laptops were used to facilitate engagement.

Implementation: Practical problems.

Although the students have a general receptiveness, there were identified a number of context-specific barriers:

- Social Loafing: The difference in student motivation resulted in some groups not having a equal work distribution and the free-rider effect.
- Systemic Constraints: The main physical obstacles were the predetermined sitting set ups that were not conducive to group work, inadequate technological facilities, and handling of high student to teacher ratios in large classes.
- Coordination: There were inflexible academic programs and deadlines that sometimes inhibited the natural flow of discussions in groups.

Methodology

Research Design

This study employed a mixed-methods approach to provide a comprehensive evaluation of the intervention. Quantitative data were gathered through a longitudinal pre- and post-intervention survey, while qualitative depth was achieved via Focus Group Discussions (FGDs) to capture the lived experiences of participants.

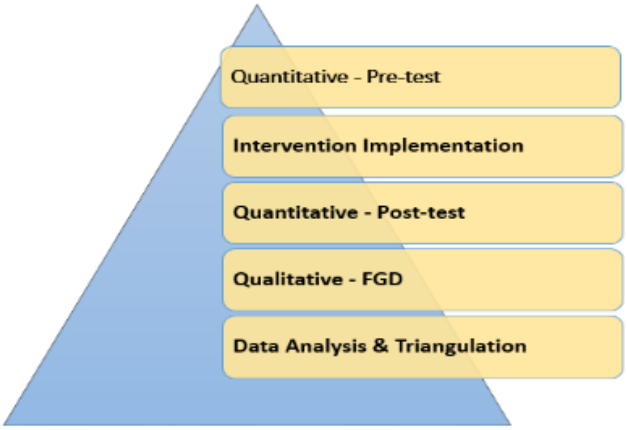

Fig. 3: Research Design

5.2 Participants and Sampling Protocol

To ensure transparency, a three-tier sampling strategy was implemented:

- Initial Pool: 200 first-year undergraduate students were randomly selected from four departments: Political Science, Economics, Sociology, and Social Work.
- Refined Sub-sample: For intensive monitoring and logistical precision, a core cohort of 80 students (N=80) was selected for the longitudinal quantitative survey.
- Qualitative Sampling: Purposive sampling was used to select 40 participants (20 teachers and 20 students) with direct experience in the intervention for the FGDs.

Data Collection Instruments

Quantitative Instrument: A validated survey questionnaire using a 5-point Likert scale (1 = Never to 5 = Always) was administered. The instrument measured engagement across ten core parameters:

Table 2: Description of Engagement Parameters

Parameter	Description
1. Participation	Active attendance in classroom work.
2. Class Presentation	As observed in presentations and participating in presentations.
3. Group work	Cooperation with colleagues.
4.Exchanging Views	Transferring thoughts and views.
5.Problem-Solving Skills	Capacity to handle and resolve academic issues.
6.Decision-Making	Academic decision-making.
7. Sharing Learning	Sharing knowledge to others.
8.Increasing Self-Confidence	Increasing self-confidence in the educational setting.
9.Feedback	Giving and receiving positive feedback.
10.Teaching Method	Perceived strategies of learning and teaching.

Qualitative Instrument: Four sessions of FGD (90 min each) were done with the help of a semi-structured guide. Themes which targeted the perceived benefits of CGW, implementation barriers and the general influence of the learning process were assessed. Audio-recorded and transcribed conversations were used to discuss the conversations.

Data Analysis Strategy

Quantitative Analysis: Descriptive statistics (mean, standard deviation) were measured in order to evaluate the engagement shifts. The significance and the effect size of the intervention were identified with the use of inferential statistics (Z-tests) and Cohen's d.

Qualitative Analysis: Thematic analysis was done on FGD transcripts. The coding and triangulation of data among various groups of participants was done in order to get validity and holistic concept.

Findings

This chapter explains how CGW influences student engagement in Bangladesh. Comparison between the data collected before and after the intervention shows that there was a great change in the rates of participation, collaboration, and problem-solving skills.

Baseline Engagement: Quantitative Analysis.

The development of baseline measures using a group of 80 students showed that there was a lack of active engagement by the students in traditional lecture environments with a mean of between 1.43 and 1.91.

Table 3: Mean and SD of Pre-intervention Metrics

Variable	Mean Pre-intervention	SD Pre-intervention
1. Participation	1.43	2.37
2. Class presentation.	1.56	1.63
3. Teamwork	1.86	2.03
4. Exchanging views	1.91	1.99
5. Problem-solving skill	1.55	2.26
6. Decision making	1.58	2.23
7. Sharing learning	1.86	2.03
8. Boosting self-confidence.	1.79	2.08
9. Feedback	1.83	2.06
10. Teaching method.	1.89	2.01
Active Engagement Score	**17.26**	**20.69**

The standard deviation (20.69) is high as compared to the mean (17.26). It indicates that traditional pedagogy is a filter, which is more inclined towards self-regulated outliers and leaves out less-motivated students.

Effect of the CGW Intervention.

The post-intervention outcomes indicated that the participation scores increased universally and

Table 4: Comparison of Pre- and Post-Intervention Data

Variables	Mean (Pre)	Mean (Post)	SD (Pre)	SD (Post)	Mean Diff.
1. Participation	1.43	2.58	2.37	1.97	1.15
2. Class presentation	1.56	2.49	1.63	1.68	0.93
3. Teamwork	1.86	2.71	2.03	1.61	0.85
4. Exchanging views	1.91	2.76	1.99	1.6	0.85
5. Problem-solving skill	1.55	2.55	2.26	1.66	1.0
6. Decision making	1.58	2.49	2.23	1.68	0.91
7. Sharing learning	1.86	2.88	2.03	1.59	1.02
8. Boosting self-confidence	1.79	2.51	2.08	1.67	0.72
9. Feedback	1.83	2.75	2.06	1.61	0.92
10. Teaching method	1.89	2.99	2.01	1.58	1.1
Active Engagement Score	**17.26**	**26.71**	**20.69**	**16.65**	**9.45**

that there was a large decrease in performance inconsistency.

A decrease in the standard deviation (20.69 to 16.65) signifies that CGW was able to close the gap of engagement and bring low-achievers to the average of the cohort. The greatest increase in Teaching Method (1.89 to 2.99) affirms that the students are ready to be taught through active instructional methods other than the traditional lectures.

Statistical and Practical Significance.

To provide a stringent evaluation of the intervention the research is applying two various statistical tests the identification of the statistical significance (chance that the difference between the means occurred by chance) with the help of the z-score analysis and the determination of the practical significance (the actual size of the effect in standardized units) with the help of the Cohen d.

Statistical Significance: Z-score Analysis.

Determining the statistical significance of the difference in the means or not is done through the Examination of the z-score by comparing it to the standard error (SE).

Table 5: Statistical Significance: Z-score Analysis

Variable	Mean Diff.	SE	Z- Score	Significance (p < 0.05)
1. Participation	1.15	.36	3.19	Significant
2. Class presentation	0.93	.26	3.58	Significant
3. Teamwork	0.85	.29	2.93	Significant
4. Exchanging views	0.85	.28	3.04	Significant
5. Problem-solving skill	1.00	.32	3.13	Significant
6. Decision making	0.91	.31	2.94	Significant
7. Sharing learning	1.02	.28	3.64	Significant
8. Boosting self-confidence	0.72	.3	2.4	Significant
9. Feedback	0.92	.29	3.17	Significant
10. Teaching method	1.10	.28	3.93	Significant
Active Engagement Score	9.45	2.97	3.18	Significant

For the aggregate Active Engagement Score:

- A Z-score of 3.18 corresponds to a p-value of 0.0014, indicating a very high level of statistical significance. The Z-test results demonstrating significant enhancements in student participation, collaboration, and learning engagement..

A Z-score analysis was done against the null hypothesis (0 change) to measure the reliability of the observed shifts in engagement. The focusing impacts are:

- The aggregate Impact: A 95% confidence level is 1.96 and the Z -score was 3.18, which is significantly very high to show statistical significance ($p < 0.0014$). This confirms that the Collaborative Group Work (CGW) intervention created a stable effect in the full cohort.
- Variable-Specific Reliability: The statistical significance of all the ten variables of engagement was achieved (($p < 0.05$).
- Primary Drivers of Change: Teaching Method ($Z = 3.93$) and Sharing Learning ($Z = 3.64$) showed the most consistent results, which shows the success of the transition to the peer-to-peer information sharing.
- .Active Engagement: The classroom shift towards student-led delivery was supported by significant variables of Teaching Method ($Z = 3.93$) and Sharing Learning ($Z = 3.64$).

Practical Significance: Cohen's d Effect Size Analysis

Whereas Z -scores are used to establish that an effect exists, Cohen's d is used to measure the strength of the impact. It is a unit less measure, which can be easily compared in various study scenarios. In this work, the pooled standard deviation of the effect size is determined as:

$$SD_{pooled} = \sqrt{\frac{SD_1^2 + SD_2^2}{2}}$$

$$d = \frac{M_{post} - M_{pre}}{SD_{pooled}}$$

According to established benchmarks, a d-value of 0.20 is small, 0.50 is medium (moderate), and 0.80 is large.

Table 6: Practical Significance: Cohen's d Effect Size

Variable	Pooled SD	Cohen's d	Effect Magnitude
Aggregate Score	**18.78**	**0.50**	**Medium**
1. Participation	2.18	0.53	Medium
2. Class presentation	1.66	0.56	Medium
3. Teamwork	1.83	0.46	Small-Medium
4. Exchanging views	1.81	0.47	Small-Medium
5. Problem-solving skill	1.98	0.51	Medium
6. Decision making	1.97	0.46	Small-Medium
7. Sharing learning	1.82	0.56	Medium
8. Boosting self-confidence	1.89	0.38	Small-Medium
9. Feedback	1.85	0.50	Medium
10. Teaching method	1.81	0.61	Medium
Note. N = 80. SE = Standard Error. All p-values are computed with respect to the null hypothesis of a zero change.			

Although, Z -scores determine the presence of a given effect, Cohen uses d to measure the size of the impact that the intervention has in standardized units. It is a unit less measure that can be compared strictly between the various educational settings.

Variable-Specific Impact and Aggregate Impact.

The Aggregate Cohen's d = 0.50 (SD = 18.78), which CGW intervention achieved, is a medium sized effect, according to standard benchmarks. This proves that the shift in the traditional way of lecturing into the collaborative pedagogy led to a significant enhancement in the total student interaction.

The granular analysis of the ten variables provides the spectrum of impact which is Small-Medium to Medium:

- Highest Practical Impact: The Teaching Method (Item 10) experienced the greatest change of the highest practical impact (d = 0.61)

indicating students found the change in the pedagogical delivery very important.

- Active Learning Indicators: Class Presentation (Item 2) and Sharing Learning (Item 7) came next with the effect sizes of d = 0.56 (both). The values show that the students have shifted their roles of the passive observers to active participants in the learning process.

Comprehensively, these data can be deemed as strong evidence that the CGW model can effectively work to destroy the pedagogical inertia that is common among the s of the National University.

Qualitative Inquiry: Synthesis of Participant Views.

Focus Group Discussions (FGDs) served as the qualitative aspects of this research to add depth to the quantitative measures, which involved the lived experiences of the instructors and students. The thematic analysis is organized in such a way that it brings out the transformative potentials and the operational realities of the intervention.

Theme 1: Benefits of Cooperative Interaction.

The participants cited that there was a significant increased motivation, which is due to the social aspects of the classroom. This change was echoed in Student-1 (FGD-2), who said that a group work made them feel happy to see other people around them towards the same goal, that the presence of peers is a psychological stimulus to continued activity. An equivalent finding was provided by Teacher-3-FGD-1, who stated that students acquired a rather conscientious disposition towards their colleagues, which practically reflected the principle of positive interdependence.

Other than motivation, there was a consistent emphasis on the growth of interpersonal and cognitive skills. Student-2 (FGD-3) also admitted that although it was not usually easy to be exposed to the variety of backgrounds, it was critical to the development of teamwork skills. To complement this, Teacher-2 (FGD-4) noted that students tend to learn together as opposed to the teacher lecturing them. Cognitively, Student-5 (FGD-1) highlighted that getting exposed to different views helped them open their eyes and thus develop a certain degree of critical thinking as would be hard to attain alone.

Theme 2: Operational Barriers and Social Processes.

Although it had positive aspects, the investigation revealed some major challenges with the most obvious one being social loafing. Student-3 (FGD-4) expressed another shared frustration when she stated, I think that I do all the work and Teacher-3 (FGD-1) assured her that there were several groups that were characterized by one or two driving students with others being just mere performers.

Moreover, role ambiguity and lack of congruent expectations tended to cause stalemate. Student-4 (FGD-2) recounted instances of groups being unable to progress because they could not reach a consensus a state which Teacher-2 (FGD-3) said was akin to giving high-achievers an unhealthy sense of responsibility. Student-3 (FGD-1) reduced the main problem to the following: I do not know what I should do in this project.

Theme 3: Ways to Pedagogical Scaffolding.

The last theme was about real-life betterments to achieve in the future. Both Student-4 (FGD-3) and Teacher-2 (FGD-4) suggested the idea of clear roles and tasks to remove inefficiency and frustration. Also, Student-3 (FGD-2) has pointed out that it is important to have a culture of respect, in which divergent opinions will be treasured even in the midst of disagreement. Lastly, Student-2 (FGD-1) and Teacher-1 (FGD-1) both pointed to the significance of the regular feedback, reminding that, in the absence of regular guidance on the part of the instructor, students will lose interest and the group process will be lowered in educational rigor.

Institutional Integration Strategic Recommendation.

According to the results of the FGD, the scaling of CGW in the s of Bangladesh is suggested to be based on three strategic pillars:

- Resource Allocation: The leaders of the institution should ensure the physical resources (e.g., flexible seating) and digital resources to facilitate group work.

- Pedagogical Training: Faculty should be trained on how to manage groups, conflict management and scaffolding.
- Curricular Embedding: Teamwork needs to be a graded element of the formal curriculum and not an isolated activity.

Discussion

The findings are strong indications that CGW is an informative pedagogue approach in the Bangladeshi higher education system. The quantitative change is synthesized with the qualitative information presented in this discussion basing on the theoretical foundation of the study.

Instructional Development and Interactive Learning.

The parameter that has changed significantly statistically in this study was in Teaching Method parameter, which has a Z = 3.93 and d = 0.61, indicating that there has been a fundamental change in the student receptivity to active learning models. This observation supports the Social Constructivist assumption that knowledge is neither a product that can be transmitted to students by an instructor, but rather a social construction that is built through social negotiation and interaction with peers.

This change in student attitude is also related to the Student Involvement Theory by Astin (1984), which argues that education results are direct result of the physical and psychological energy which students have put into their learning environment. The CGW intervention approach shifted the previously passive educational approach of the past where a bank model of education is commonplace, compelling students to make more significant investments, which is associated with the intellectual benefits in the post-intervention outcomes.

What is more, these empirical findings reflect the first in the series of meta-analyses led by Freeman et al. (2014), who showed that active learning lowers the percentage of failures and increases STEM performance in contrast to traditional lectures. At the local level, this transition serves the purpose of the thirst of learning that is provided by the national education policy (2010). The fact that the Bangladeshi undergraduates have a high Z-score in the teaching methodology confirms not only the readiness of these students to, but also performs well under, the discontinuation of the paradigm of teacher-centered teaching, when these transitions are accompanied by organized collaborative systems.

Equity and the Community of Practice.

The critical quantitative result of this research was the fact that the Standard Deviation is reduced by a considerable margin as it was decreased by 20.69 to 16.65. This reduction in variance is indicative of the fact that CGW serves as a form of an equalizer that tends to make the engagement disparity between high-achievers and hitherto disengaged students narrow.

This change reflects the Situated Learning Theory of Lave and Wenger (1991), in which classroom turns into a community of practice. Learning in the latter environment is considered an act of belonging and gradually the peripheral participants, usually the low achievers or marginalized students are gradually pulled into the full participation by being systematically scaffolded by their peers.

In addition to this, the data also confirms the ideas of Skinner and Belmont (1993), who claimed that it is necessary to have well-organized social structures in the classroom that would help to create the sense of belonging. The intervention offered the relatedness that was required to maintain uniform academic attendance among various student samples by establishing an atmosphere of collaboration and not rivalry, so that it was not only the naturally motivated outliers that engaged in it but it became an organizational phenomenon across the group.

Agency and the Safe Space of Gender.

The CGW intervention greatly interfered with the usual power structure of classrooms, which have historically held the female students back to the background owing to the existing socio-cultural standards in Bangladesh. The identified increase in agency has a strong foundation on the Self-Efficacy Theory by Bandura (1997), specifically, using the concept of social persuasion and vicarious experiences. When the female participants saw their peers succeed in working in teams, their own perceived self-efficacy was boosted.

Although Focus Group Discussions reported that female students were more comfortable sharing ideas, which was also supported by Sultana (2020), the data also showed that the male dominance tendency in leadership remained one of the issues. This implies that psychological safety cannot be a complete catalyst of complete equity. Consequently, pedagogical design should not merely involve mere grouping but instructors should assign particular roles to make sure that agency is shared equally along gender lines.

The Behavioral-Affective Latency Gap

One of the main findings of this work was that the difference between the rapid development of behavior and the slower development of affective internalization is present. Although Participation (d = 0.53), increased rapidly, Self-confidence (d = 0.38) had the smallest level of effect. The best way to explain this discrepancy is by the Self-Determination Theory (SDT) proposed by Deci and Ryan (1985). The extrinsic form of the group intervention was rather effective in requiring behavioral attendance, but the intrinsic form of internalizing confidence, or the sense of genuine competence, needs a temporal perspective to evolve.

This latency effect proves the existence of behavioral changes which are most of the time preludes to profound psychological changes. The literature on student engagement has confirmed this difference; as an example, Fredricks, Blumenfeld, and Paris (2004) postulate that behavioral engagement is easier to observe and is more responsive to short-term environmental fluctuations; affective engagement, however, is more slowly-growing and more emotionally invested. On the same note, Zepke and Leach (2010) also opine that in order to take engagement beyond the stage of procedural compliance into that of substantive agency, the learner should feel a long-term payoff in the social interaction, which in most cases would be lagging behind the original change of classroom routine.

Moreover, the article by Kahu (2013) highlights the fact that the interaction between the student and the group task is a social-psychological phenomenon in which the former is a precondition of the latter (the sense of efficacy). It is only natural that the effect size of self-confidence in the current study is lower than what Bandura (1997) claims since mastery experiences, the strongest source of self-efficacy, take repeated and sustained success to create an irreversible change in the self-concept of a student. Therefore, pedagogical interventions in Bangladeshi setting have to be maintained through the long-term, but not as one-time, short-term interventions in case of the intention to stabilize permanent affective profits and authentic academic assertiveness.

Structural Barriers and personal responsibility.

Although there is quantitative success of the intervention, the qualitative continuation of the social loafing and the process of free-riding shed light on the intrinsic drawbacks of unorganized teamwork. The Cooperative Learning Theory, as suggested by Johnson and Johnson (1999) states that Individual Accountability and Positive Interdependence have to be carried out simultaneously in order to achieve meaningful engagement. The FGD information that indicated that driving students were burdened indicates that as collaborative efforts fail to properly establish roles, they may degenerate into pseudo-groups and not high-functioning learning communities.

It is a challenge that was already described in the literature; as Slavin (2014) points out, group goals cannot be effective unless every member is responsible to complete a specific part of the task. Moreover, Kuh (2001) observes that rigorous structure is essential to high impact educational activities so as to make sure that everyone involved is cognitively challenged and not a mere presence. The fact that the Bangladeshi context had no experience of formal collaboration protocols, this problem was probably driven by the fact that students did not have the cooperative scripts needed when dealing with group conflict, and work allocation.

In addition to the dynamics in behavioral aspects, Dewey, (1938) stated that education is a societal process that involves the physical environment to adapt to the pedagogy. The “situational issues/ problems that the FGDs singled out, namely the high numbers in classrooms and strict seating, are reflected in what Leander et al. (2010) did in their discussion of the spatiality of learning. They claim

that conventional straight forward rows are built to be passively consumed and thus form barrier to collaborating geographically.

We find that our results are similar to those of Islam et al. (2021), who support the redesign of the infrastructure in the Bangladesh s at the systemic level. Switching to modular, flexible seating is not a simple cosmetic change, but a needed scaffolding process towards the so-called communities of practice outlined by Lave and Wenger (1991). Unless the physical environment is modified in such a way, the most innovative pedagogical intervention will come under considerable friction.

Conclusion and Recommendations

Conclusion

The work presented in this study supports the claim that CGW can indeed be used to substantially rejuvenate the student engagement in the National University-based s in Bangladesh. The results of the statistical analysis, which show high Z-scores and medium-large effect sizes, suggest that a shift to a student-centered model of learning, as opposed to an old, teacher-centered paradigm based on lectures, brings about statistically significant improvements in behavioral, cognitive, and affective engagement.

The results indicate that the intervention alleviated widely experienced pedagogical issues, e.g., learner indifference and technological distractions by reorganizing classroom into a group of peer students. The effect of this was on the practice of collective responsibility, with a culture of responsibility prevailing because of this shift. Finally, this study shows that the active learning requirements of the National Education Policy (2010) may be implemented in terms of group-based pedagogical intervention, organized in a structured manner, even in the context of a resource-constrained environment.

Practice and Policy Recommendations.

To sustain the achieved benefits in engagement and institutionalize active learning throughout the National University of Bangladesh, the following evidence-based alternatives are suggested:

Pedagogical Capacity Building and Professional Learning Communities (PLCs).

- Precondition: CGW is based on the psychological and professional preparedness of faculty members and students.
- Institutional Orientation: The s should implement training programs involving the discussion of the theoretical basis (Social Constructivism) and the practical implementation of collaborative learning.
- Sustained Peer Support: Institutions ought to create PLCs and peer-mentoring networks to enable the teachers to problem-solve collectively in context-based issues, including high student-to-teacher ratios and the unbending assessment schedules.
- Guideline of Instructional Design and “Personal Responsibility” Framework.
- Intentional Gratification: CGW should be clearly aligned with learning outcome and assessment standards to shift towards procedural compliance.
- Role Transition and Monitoring: Teachers are to shift their role of being knowledge transmitters to that of facilitators who closely monitors the group dynamics and each student separately accountable.
- Reducing the Free-Rider Effect: The assessment systems are to be restructured in order to record the individual level and aggregate group level. This will make sure that driving students do not have to be unfairly overworked whilst others practice social loafing.

Composition of Strategic Groups and Social Presence.

- Ideal Group Size: To have manageable coordination as much as possible loafing is reduced by keeping the group heterogeneous of three to five students.
- Diversity as an Equity Tool: A balance of academic ability, gender, and learning styles should be provided in groups to create the dialogue of multi-perspectives and reduce the gap of engagement.
- Shocking Power Distance: In high power-distance societies, the instructors need to employ the icebreakers and formal group norms such as active listening and mutual respect to change the culture of the classroom into a collaborative and not a competitive one.

- Scaffolding of Environment and Technologies.
- Physical Modularization: Systematic reform involves ceasing to sit with fixed seats to more flexible learning areas where one can easily transition to group-work.
- Blended Learning Integration: To fill the gap existing between in-class and self-study, institutions ought to use low-bandwidth and mobile-friendly EdTech.
- Real-time Feedback Tools: Google Classroom, MS Teams, and collaborative documents (e.g., Padlet) should be utilized to track the input of the students in real-time and offer formative feedback.

Future Research and Limitations.

Although the results are positive, there are various limitations that should be observed in order to put into perspective the findings.

External Validity: Since the study was carried in one National University based , the results might not be entirely applicable to all varieties of infrastructures and student to teacher ratios in all institutions of Bangladesh.

- Temporal Scope: The short-term nature of the intervention prevents making any inferences about the long-term maintenance of the behavioral changes and student self-confidence.
- Stakeholder Representation: The voices of institutional administrators or national policymakers were not formally represented in the mixed-method approach currently in place, and their support is crucial in breaking through the established systemic barriers, like the pressure of funding or standardized testing.

Further studies would be based on multi-center longitudinal studies with various regions and including administrative stakeholders to acquire more information about the systemic obstacles of pedagogical reform and the effectiveness of the blended collaborative models in the long term.

Declaration of Interest and Ethical Statement

The authors have no known or suspected conflicts of interest with regards to the research and authorship, as well as publication of this article. There was no commercial or public funding agency that provided financial aid or grants to this study that would affect the results of the study.

The entire operations conducted in this research that used human participants were within the ethical standards of the institutional research committee and the Helsinki declaration of 1964 and subsequent amendments. All individual participants who were involved in the Informed Consent procedure (N=80) were informed before the 120-day longitudinal survey and Focus Group Discussions. The participants were informed about the purpose of the study, their free will to quit at any point, and the assurance of complete anonymity and confidentiality of their personal and academic information.

Data Availability Statement.

The quantitative and qualitative data generated and discussed in the present research are not publicly accessible because the participants were informed about the study related to their privacy but could be accessed by the respective researcher at their own request.

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