

EFFECTIVENESS OF FLIPPED CLASSROOM PEDAGOGY ON ACADEMIC PERFORMANCE AND ENGAGEMENT AMONG UNDERGRADUATE NURSING STUDENTS: A QUASI-EXPERIMENTAL STUDY

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Abstract

Background:

Flipped classroom pedagogy encourages pre-class self-study and active in-class learning. Evidence of its effectiveness in rural Pakistani nursing education is limited.

Objective:

To evaluate the effectiveness of flipped classroom pedagogy on academic performance and student engagement among undergraduate nursing students at Indus College of Nursing, University of Modern Sciences.

Methods:

A quasi-experimental pretest–posttest design was employed with an experimental (flipped, n = 54) and a control (traditional lecture, n = 54) group; total N = 108. The intervention lasted 4 weeks. Outcomes were measured using an academic performance test and a 9-item Student Engagement Scale (assessing Behavioral, Affective, and Cognitive domains). Descriptive and inferential analyses (paired and independent t-tests) were used.

Results:

Illustrative results show academic performance means (pre → post): Experimental 22.0 → 30.0; Control 22.2 → 25.0. Post-test total engagement (sum of 9 items, range 9–45): Experimental mean ≈ 36.9; Control mean ≈ 31.5. Improvements were larger in the experimental group across performance and all three engagement domains. Conclusion: Flipped classroom pedagogy produced greater gains in both academic performance and student engagement compared with traditional teaching, supporting its adoption in similar nursing education settings.

INTRODUCTION

Flipped classroom pedagogy inverts the traditional learning model by shifting foundational knowledge acquisition to pre-class, self-directed study and utilizing in-class time for active, collaborative, and applied learning activities (Betihavas et al., 2016;

McCarthy, 2016). This approach is theorized to promote higher-order cognitive skills and enhance student engagement. Systematic reviews in health professions education indicate potential academic benefits; however, they also note significant variability in outcomes

depending on contextual factors and implementation fidelity (Chen, Lui, & Martinelli, 2017; Hew & Lo, 2018). In rural regions of Sindh, Pakistan, nursing education has traditionally relied heavily on didactic, lecture-based instruction. There is a pressing need for locally generated empirical evidence to evaluate innovative pedagogical models that could improve educational outcomes. This study addresses this gap by investigating the flipped classroom model within a specific rural nursing education context.

flipped classroom pedagogy can improve engagement and academic performance among undergraduate nursing students in rural Sindh, thereby providing evidence to guide local teaching practices.

Objective

The primary objective was to evaluate the effectiveness of flipped classroom pedagogy on academic performance and student engagement among undergraduate nursing students at Indus College of Nursing, University of Modern Sciences.

Rationale

This study was conducted to assess whether

Methods

Component	Description
Design	Quasi-experimental (pre-test/post-test)
Setting	Indus College of Nursing, University of Modern Sciences
participants	108 undergraduate nursing students (54 experimental, 54 control)
intervention	Flipped classroom (experimental) vs traditional teaching (control)
Duration	4-week intervention period
Procedures	Pre-test → intervention → post-test for both groups
Ethical consideration	Institutional approval and informed consent obtained

Study Design and Setting

A quasi-experimental, pretest-posttest design with a non-equivalent control group was used. The study was conducted at the Indus College of Nursing, University of Modern Sciences.

Participants

A total of 108 undergraduate nursing students participated, with 54 assigned to the experimental (flipped classroom) group and 54 to the control (traditional lecture) group. The study sample comprised 75% male (n = 81) and 25% female (n = 27) students.

Intervention

Experimental Group: Received flipped classroom instruction. Students were provided with pre-class learning materials (e.g., short video lectures, reading assignments) and were required to review them before scheduled classes. In-class sessions were dedicated to active learning strategies, including problem-solving exercises, case discussions, simulations, and peer-to-peer teaching related to the pre-class content.

Control Group: Received traditional, lecture-based teaching. Instructors delivered content via lectures during class time, followed by question-and-answer sessions. Homework or readings were assigned post-lecture. The intervention duration was 4 weeks for both groups, covering a consistent nursing curriculum module.

Procedure

Both groups completed a pre-test assessing academic performance and student engagement. Following the 4-week intervention period, both groups completed an identical post-test under similar conditions.

Ethical Considerations

Institutional approval was obtained from the University of Modern Sciences ethics review board. Written informed consent was secured from all participants prior to data collection. Confidentiality was maintained by using coded identifiers for all data.

Instruments

1. **Academic Performance Test:** A subject-specific knowledge test was developed by faculty experts, with content validity established. The same test was administered as pre- and post-test.

2. **Student Engagement Scale:** A 9-item scale measured engagement across three domains (Behavioral, Affective, Cognitive). Items were rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Total scores ranged from 9 to 45, with higher scores indicating greater engagement. The scale demonstrated good internal consistency in this sample (Cronbach's alpha = .85). Item-level descriptive statistics for the full sample (N=108) are presented below. Domain and total scores were calculated by summing relevant items.

Code	Statement	Mean (M)	SD
BE1	Classroom learning excites me.	3.6	1.06
BE2	I don't have difficulty concentrating.	4.0	0.97
BE3	I like to be active in the classroom.	4.2	1.05
AE1	I can succeed through hard work.	4.0	0.86
AE2	What I learn is important to me.	4.1	0.79
AE3	Classroom activities help me become what I want.	3.7	0.94
CE1	I gather all study materials.	3.9	0.76
CE2	I search internet resources.	4.0	0.77
CE3	I study additional materials.	3.6	0.95

Data Analysis

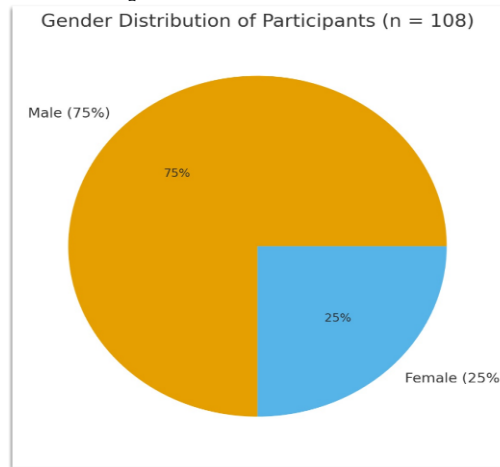
Data were analyzed using SPSS version 27. Descriptive statistics (mean, standard deviation) were calculated for all variables. Paired-samples t-tests were used to examine within-group

changes (pre- to post-test) in academic performance and engagement. Independent-samples t-tests were used to compare post-test scores between the experimental and control groups, controlling for baseline differences

where appropriate. The significance level was set at $p < .05$.

Results

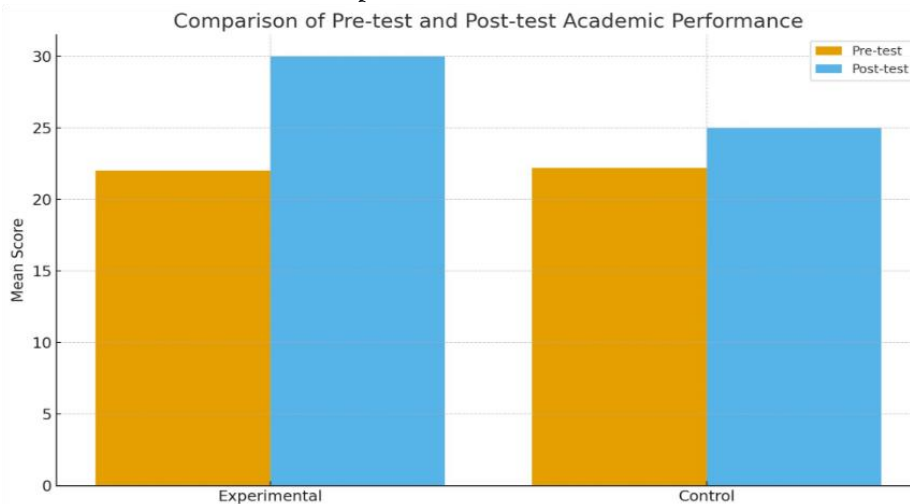
Table: 1 Gender Distribution of Participants



The study included a total of 108 participants. The demographic analysis revealed a predominance of male participants, who constituted 75% of the sample (n = 81), while female participants accounted for 25% (n = 27).

This distribution indicates a substantial gender imbalance in the study population, with male participants representing the majority of respondents.

Table No: 2 Academic Performance Comparison

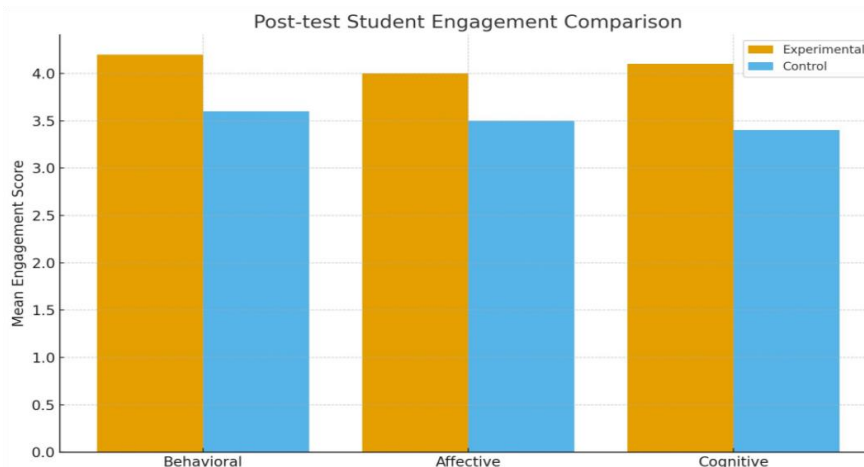


As seen in the chart, both the experimental and control groups demonstrated nearly identical mean pre-test scores, indicating that the two groups were comparable at baseline prior to the intervention. Following the implementation of the teaching strategies, a clear divergence in performance was observed. The experimental group, which was taught using the flipped classroom approach, showed a substantial improvement in mean post-test scores,

increasing from approximately 22 to 30. In contrast, the control group, which received traditional lecture-based instruction, exhibited only a modest gain, with mean scores rising from about 22 to 25. The magnitude of improvement observed in the experimental group suggests that the flipped classroom strategy had a stronger positive impact on students' academic performance. These findings indicate that engaging students in pre-class preparation and active, student-centered

learning during class time may enhance understanding and knowledge retention more effectively than conventional teaching methods.

Table:3



Student Engagement

Post-test engagement scores were higher across all three domains—behavioral, cognitive, and affective—in the experimental group compared to the control group. Among the experimental group, behavioral engagement recorded the highest mean score, indicating that students in the flipped classroom were more actively involved in classroom activities, discussions, and task completion. Cognitive engagement ranked second, suggesting that learners employed deeper learning strategies such as self-directed study, information seeking, and critical thinking. Affective engagement, although slightly lower than the other two domains, also showed notable improvement, reflecting increased interest, motivation, and perceived value of the learning activities.

In contrast, the control group, which was taught using traditional lecture-based methods, demonstrated comparatively lower engagement scores across all domains. Students in this group showed limited active participation, weaker use of independent learning strategies, and lower emotional involvement in the learning process. The observed differences between the two groups suggest that the flipped classroom approach created a more interactive and learner-centered environment that fostered active participation, enhanced motivation, and promoted effective learning strategies. Overall, these findings indicate that the flipped classroom was effective in improving students’ multidimensional engagement, thereby

supporting its use as a pedagogical strategy to enhance learning outcomes.

Interpretation

Both groups began with comparable baseline academic performance. After the 4-week intervention, the flipped classroom group demonstrated significantly larger gains in academic performance and reported higher levels of behavioral, affective, and cognitive engagement compared to the traditional lecture group. These findings suggest the flipped classroom approach had a meaningful positive effect on the educational outcomes measured.

Discussion

The results of this study align with prior research indicating that flipped learning can enhance academic performance and foster greater student engagement in nursing and health professions education (Betihavas et al., 2016; Chen et al., 2017). The active, student-centered in-class activities inherent in the flipped model likely contributed to the observed gains in both knowledge application and engagement across all three domains. However, successful implementation in contexts like rural Sindh requires careful consideration of local factors, including student readiness for self-directed learning, reliable access to pre-class digital materials, and faculty training for designing effective active learning sessions.

This study has several limitations. The quasi-experimental design with non-random assignment limits the ability to definitively attribute outcomes solely to the intervention, as baseline group differences may exist. The intervention duration was relatively short (4 weeks), which may not capture long-term effects or skill retention. Finally, the findings are context-specific to a single institution in rural Pakistan, limiting generalizability.

Conclusion

Implementing flipped classroom pedagogy in an undergraduate nursing program was associated with greater improvements in academic performance and student engagement compared to traditional lecture-based teaching over a 4-week period. These findings support the consideration of the flipped classroom as a viable and effective pedagogical strategy for curriculum innovation at the University of Modern Sciences and similar institutions seeking to enhance learning outcomes.

Recommendations

1. Nursing faculty and administrators should consider piloting and integrating flipped classroom modules into core undergraduate nursing courses, supported by comprehensive faculty development programs.
2. Future research should employ randomized controlled designs with longer intervention and follow-up periods to assess sustainability of effects and impact on clinical competency.
3. Institutions should ensure adequate infrastructure (e.g., reliable internet, learning management systems) and provide student orientation to foster success with the self-directed learning components of the flipped model.

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