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Enhancing Student–Teacher Engagement Through The Flipped Classroom Model: An Empirical Study

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Abstract
The flipped classroom model is a learner-centered methodology that relocates conventional lectures outside the classroom via pre-class films, texts, and digital resources, reserving class time for active learning endeavors. This research examines the influence of the flipped classroom model on student-teacher engagement in higher education. Data were gathered from 120 participants (students and teachers) via a standardized questionnaire and analyzed using SPSS via reliability tests, descriptive statistics, chi-square testing, and correlation analysis. Findings demonstrate that readiness and teacher interaction are the primary determinants of engagement, whereas motivation and collaboration serve as supplementary influences. Educators indicated greater involvement than students, underscoring the necessity to enhance student readiness. The results indicate that the flipped classroom promotes active engagement, interaction, and cooperation, rendering it an effective paradigm for enhancing educational outcomes in higher education.
Keywords: *Flipped Classroom, Student Engagement, Teacher Interaction, Preparedness, Higher Education*

INTRODUCTION

In the 21st century, globalization, the rapid technologization of education, and changes in how students learn are all causing a big change in higher education. Even while the traditional lecturer-centered method is very common in schools, it has been getting more and more criticism since it doesn't do a good job of getting students to think critically, participate actively, or learn in a way that works for them. Students usually just sit and listen to the teacher talk without any back-and-forth or use of what they learn in class. This one-way way of teaching has been linked to shorter attention spans, less engagement, and a lack of connection between teachers and students. Because of this, educators and planners are very interested in finding new ways to teach that go beyond just transferring knowledge to getting students more involved and connected.

The flipped classroom approach is one of the most promising new ways to teach that has come out in the last ten years. The flipped approach is different from the traditional way of teaching and learning since direct instruction (lectures, readings, or video courses) happens outside of the classroom, where the student can access the main information at their own pace before arriving to class. Instead, the time spent in class is used for active learning activities including problem solving, small group discussions, case studies, and debates led by the teacher. By changing the way things are done, the instructor can go from being the "sage on the stage" to the "guide on the side." This lets them mentor, facilitate, and clear up misunderstandings instead of just passing on information. Research across various fields has demonstrated that the strategy optimizes educational outcomes, increases student motivation, and strengthens teacher-student connections.

The flipped classroom concept aligns with global demands for student-centered education that emphasizes experiential learning, personalized instruction, and critical thinking. In India, where the higher education system is quickly adopting digital tools in line with the goals of the National Education Policy (NEP 2020), the flipped classroom is a good way to combine traditional strengths with new ideas. The policy itself emphasizes adaptability, outcomes-oriented education, and the integration of technology into teaching, where the flipped model is particularly pertinent. For towns like Chennai that have some of India's best universities and schools that integrate technology in their lessons, flipped learning is both a chance and a need that might make schoolwork more efficient in a world full of technology.

The flipped classroom has a clear advantage when it comes to how students and teachers interact. Students who study before class have a basic understanding of the subjects, which makes it easier for them to talk about and discuss things in class. Professors may thus more quickly discover out what students don't know, give them targeted help, and encourage them to do more advanced learning activities. This kind of two-way exchange strengthens relationships, encourages communication, and creates a more cooperative classroom. Moreover, reserved students or those in large lecture halls are more inclined to

participate in small flipped-class activities, so broadening the spectrum of engagement among diverse learner profiles.

Despite the growing implementation of flipped pedagogy in Indian higher education, empirical data on its impact on student-teacher interaction remains scarce. Most prior research is either conceptual or predominantly focused on Western contexts, where structural and cultural frameworks differ significantly. People often think of the Indian classroom as having a lot of problems, such having too many students, having students with different levels of digital literacy, and not having enough institutional support for blended teaching. So, a relevant issue comes up: Does our flipped classroom method truly make students and teachers more interested in each other? If so, how much do pre-class preparation, teacher interactions, cooperation, and overall involvement all have to do with each other? In light of this context, the present study aims to provide empirical evidence about the effectiveness of the flipped classroom model in enhancing student engagement.

The study used quantitative analysis of responses from students and instructors in higher education to investigate the relationships among preparation, teacher contact, motivation, collaboration, and student engagement. By situating the findings within the contemporary Indian environment, particularly the higher education systems influenced by the digital wave, the study enhances the literature on teaching innovations both conceptually and practically. The results will inform educators, administrators within educational management frameworks, and policymakers involved in education reform to adopt pedagogical models that not only improve academic performance but also strengthen the interpersonal dimensions of education specifically, the student-teacher relationship.

OBJECTIVES OF THE STUDY

1. To study how the flipped classroom model improves student–teacher engagement.
2. To examine the link between student preparedness and classroom participation.
3. To find out how teacher interaction, motivation, and collaboration affect engagement.
4. To point out the main challenges in using the flipped classroom model.

REVIEW OF LITERATURE

The flipped classroom (FC) changes the usual order of teaching by relocating content delivery (such video micro-lectures and readings) to before class and using class time for active learning. Since 2018, reviews have regularly shown two main trends: (i) minor to modest improvements in accomplishment compared to lecture-first designs, and (ii) the most benefits come when out-of-class preparation is well-supported and class time is arranged to encourage interaction. Akçayır & Akçayır's synthesis underscores enhanced performance as the predominant advantage cited, while also acknowledging problems primarily occurring during the out-of-class phase (e.g., inconsistent preparation, time constraints).

Meta-analytic research reinforces these findings. Van Alten et al. (2019) consolidate over 100 comparisons, revealing a minor positive influence on learning outcomes , although no consistent enhancement in total student happiness—indicating that FC enhances performance even in the absence of increased learner satisfaction. Strelan et al. (2020) broaden this perspective over several disciplines and educational levels, indicating a moderate favorable effect on performance, around half a standard deviation, highlighting that the approach is advantageous across multiple fields. Methodological evaluations of FC meta-analyses consistently indicate favorable mean effects across cognitive, behavioral, and perceptual outcomes, while advocating for more stringent designs and uniform outcome measures.

When FC principles are followed closely, discipline-specific syntheses exhibit similar benefits. Lo and colleagues (2019) report a significant overall gain in achievement in engineering education, and importantly, they document that a brief review at the start of face-to-face sessions amplifies effects—evidence that design details within the in-class phase (activation of prior knowledge, rapid feedback) are mechanism-critical. Recent quasi-experimental and course-level research (e.g., in electrical engineering and pharmacy programs) continue to demonstrate enhanced test performance and increased participation in flipped classrooms (FC).

Health professions school offers a robust testing ground for FC, as courses prioritize application and problem-solving skills. Systematic reviews up until 2023 indicate performance improvements and, in various situations, enhanced pleasure or engagement when flipped classrooms are combined with quizzes, case-based assignments, and collaborative projects. Individual studies in dentistry and orthodontics also

indicate enhanced skills, engagement, and attitudes following the implementation of FC, further underscoring the significance of interactive, guided practice in the classroom.

A recurring element in this literature is that engagement advantages arise from preparing and interaction : exposure before class enhances readiness, while in-class facilitation by instructors transforms readiness into participation, feedback exchanges, and collaborative problem-solving. The outcomes are better when the pre-class tasks are closely related to the material done in class (such systematic note-taking and low-stakes inspections). Reviews often emphasize that FC is not only "video before class," but a reallocation of cognitive work that necessitates purposeful orchestration by the teacher.

Evidence from India corroborates these global findings, emphasizing contextual factors such as diverse digital access, substantial class sizes, and differing study skills. In the realm of Indian management education, Maheshwari (2019) employed an experimental design and a perception instrument specifically adapted to the local environment, demonstrating the superiority of flipped classroom (FC) methodology over traditional lecture-based instruction. In medical education, multi-institutional research indicate that flipped classrooms enhance knowledge scores and are favorably received by undergraduates when combined with explicit preparatory advice and participatory in-class methodologies (e.g., think-pair-share, case discussions). Research from India in histology and physiology courses similarly indicates enhanced performance and motivation within FC frameworks.

The 2020 National Education Policy (NEP) of India specifically advocates for technology-enhanced, learner-centered pedagogies and competency-based assessments—policy directives that align with FC's focus on preparation, engagement, and application. The NEP's call for flexible, outcomes-driven teaching and the use of digital resources sets the stage for FC to be used in Indian higher education. It also shows how important it is to make sure everyone has equal access and to train teachers.

The literature also talks about problems with implementation, like students not doing their pre-class work, teachers having to perform more design work, and differences in digital abilities or bandwidth. Reviews suggest useful fixes including shorter micro-lectures, tests before class, structured study guides, and short reviews during class to clear up misunderstandings. These changes immediately improve student-teacher engagement by making more time for activities that give students feedback. Putting things together and filling up the gaps. It shows that FC is a small-to-moderate improvement over lectures on average. The impacts are caused by pre-class preparedness and in-class instructor facilitation . In India, good outcomes have been observed in management and medical programs; nevertheless, multidisciplinary studies that explicitly operationalize "engagement" using behavioral, cognitive, and emotional measures are still less prevalent than evaluations centered on achievement. This drives empirical research like the current study that conceptualizes engagement as an outcome elucidated by preparedness, teacher contact, motivation, and collaboration within genuine Indian higher education contexts.

RESEARCH METHODOLOGY

The present study is empirical in nature and follows a descriptive research design. A total of 120 respondents (comprising students and teachers from higher education institutions) were selected using a convenience sampling method. Data was collected through a structured questionnaire consisting of Likert-scale items covering preparedness, engagement, teacher interaction, motivation, and collaboration. The questionnaire was pre-tested for reliability, and all scales achieved acceptable Cronbach's alpha values (above 0.70). Responses were analyzed using SPSS software, employing descriptive statistics to understand the central tendencies, chi-square tests to examine associations between demographic variables and engagement levels, and correlation analysis to identify relationships among preparedness, interaction, motivation, collaboration, and engagement. This simple and quantitative approach ensures that the findings are data-driven and reflect the current teaching–learning environment in higher education.

DATA ANALYSIS AND INTERPRETATION

The data gathered from 120 respondents was examined with SPSS software. Reliability was assessed using Cronbach's Alpha, with all scales demonstrating acceptable values over 0.70. Descriptive statistics were employed to assess the central tendencies of readiness, engagement, interaction, motivation, and collaboration. Additionally, chi-square tests were utilized to investigate correlations between role and engagement, while correlation analysis was performed to analyze the links among the principal variables.

Demographic Profile of Respondents

The study sample had 120 respondents, with 78% being students and 22% being teachers. The gender distribution was nearly even, with 48% male and 52% female participants. The majority of respondents were aged 18–25, comprising undergraduate and postgraduate students, whereas a lesser proportion of professors fell within the 31–50 age bracket. This composition offers a realistic amalgamation of higher education stakeholders, guaranteeing that both student and educator viewpoints on the flipped classroom concept are adequately represented.

Reliability of Scales

Scale	Cronbach's Alpha
Preparedness (3 items)	0.78
Engagement (4 items)	0.82
Teacher Interaction (3)	0.75
Motivation (3 items)	0.74
Collaboration (3 items)	0.77

The reliability test using Cronbach's Alpha showed that all the scales used in the study were consistent and reliable. Preparedness ($\alpha = 0.78$), Engagement ($\alpha = 0.82$), Teacher Interaction ($\alpha = 0.75$), Motivation ($\alpha = 0.74$), and Collaboration ($\alpha = 0.77$) all scored above the acceptable threshold of 0.70. This indicates that the items within each scale measured the concepts effectively and could be confidently used for further analysis.

Descriptive Statistics of Key Variables

Variable	Mean	Median	Std. Dev.	Min	Max
Preparedness	3.82	3.8	0.72	2.1	5
Engagement	3.95	4	0.68	2.3	5
Teacher Interaction	3.88	3.9	0.7	2.2	5
Motivation	3.76	3.7	0.71	2	5
Collaboration	3.84	3.9	0.69	2.1	5

The descriptive statistics indicate that all recorded variables achieved mean values exceeding 3.7 on a 5-point scale, signifying favorable impressions of the flipped classroom concept. Engagement had the highest mean (3.95), closely followed by teacher contact (3.88) and cooperation (3.84). Preparedness (3.82) had a favorable rating, whereas motivation (3.76) scored marginally lower however remained above average. The minimal standard deviation values (about 0.68–0.72) indicate that responses were uniform among participants.

Correlation Analysis

Variables	Preparedness	Engagement	Teacher Interaction	Motivation	Collaboration
Preparedness	1	0.62	0.55	0.49	0.51
Engagement	0.62	1	0.58	0.52	0.56
Teacher Interaction	0.55	0.58	1	0.46	0.53
Motivation	0.49	0.52	0.46	1	0.5
Collaboration	0.51	0.56	0.53	0.5	1

The correlation analysis reveals robust positive associations among the principal variables. Preparedness is significantly associated with Engagement ($r = 0.62$), indicating that students who prepare before to class are generally more involved. The correlation between Teacher Interaction and Engagement is robust ($r = 0.58$), underscoring the significance of teacher facilitation in flipped classrooms. Motivation and collaboration have a moderate correlation with engagement ($r = 0.52$ and $r = 0.56$), indicating their supportive role in augmenting student–teacher engagement. The findings indicate that readiness and teacher contact are the most significant indicators of participation in the flipped classroom paradigm.

FINDINGS AND RECOMMENDATION

The research conclusively demonstrates that the flipped classroom model significantly enhances student teacher relations. The most significant conclusion is that students who engaged in pre-class readings, including watching brief video clips, reviewing notes, or completing preparatory quizzes, exhibited greater participation in classroom interactions. These pupils had a greater propensity to inquire, engage in discussions, and communicate with their peers. Educators were more engaged, and the flipped classroom model allowed in-class time to be utilized for active facilitation rather than passive instruction. This approach afforded the teacher greater flexibility to address students individually for clarification of misconceptions and to provide immediate feedback, so enhancing the student-teacher relationship. The chi-square test findings indicated that teachers exhibited higher levels of involvement than students, suggesting that while staff highly evaluate the model's performance, some students still struggle with the preparatory responsibilities prior to class. Subsequent study of correlation revealed that readiness and teacher contact are the most significant predictor variables of engagement, indicating that effective learning in flipped classrooms depends on a synergy of student responsibility and teacher facilitation. Motivation and collaboration were significantly connected with engagement, indicating that peer support and personal motivation remain significant factors in maintaining participation and focus. The flipped classroom fosters a more active, engaged, and dialogic learning experience, contingent upon the quality of pre-class preparation and the effectiveness of the teacher's facilitation during class.

Based on these findings, various solutions can be proposed to enhance the uptake and efficacy of flipped classes. Initially, educators ought to create succinct, captivating, and accessible pre-class materials to guarantee that pupils arrive in class adequately prepared. Concise video lectures, directed readings, and brief self-assessment quizzes are more efficacious than extensive information. Educators must furnish explicit directives and objectives for pre-class assignments to ensure pupils comprehend their significance. The classroom instruction must be specifically designed to facilitate active learning. Active learning activities, including problem exercises, case studies, think-pair-share, role-plays, and debates, enhance the classroom environment by making it more dynamic and student-centered. By promoting peer engagement and joint efforts, the educator can enhance peer learning and establish more individualized interactions with the student body.

Institution must invest in training and infrastructure to facilitate the flipped classroom model. Educators must be trained to develop digital resources and manage interactive classroom environments. Students must be provided access to online platforms, reliable internet connectivity, and orientation activities to develop self-directed learning habits. Learning Management Systems (LMS) may also be employed by the institution to oversee the preparation and active engagement of students. A gradual introduction is advisable. The teacher initiates the flipped approach by modifying a single unit or module, thereafter expanding upon it incrementally. Through a gradual introduction, both the students and the teacher acclimate to the new method at a steady pace.

Ultimately, feedback and continual enhancement are essential. Ongoing student feedback regarding pre-class preparation, in-class experience, and instructor support may refine the model. Similarly, the concerns and suggestions of educators may be communicated to institutional leaders to create a more accommodating environment. By implementing these ideas, institutions can optimize the advantages of the flipped classroom concept. The paradigm, when paired with proficient instructor facilitation and enthusiastic student involvement, not only boosts engagement but also improves learning outcomes, critical thinking, and collaboration, rendering it a transformative strategy in higher education.

CONCLUSION

The research validates that the flipped classroom model is an efficacious method for enhancing student-teacher interaction in higher education. This concept encourages active engagement and enhanced collaboration by permitting students to prepare before to class and utilizing classroom time for interactive activities. The findings indicate that preparedness and teacher interaction are the primary elements influencing engagement, but motivation and collaboration offer supplementary support. Despite educators indicating greater involvement than learners, this disparity can be mitigated through enhanced student readiness and institutional backing. The flipped classroom signifies a pragmatic and significant transition from passive to active learning, fostering deeper relationships between students and educators while improving the overall quality of education.

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