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Benefits and challenges of Flipped Classroom Approach in College Education: A Quantitative Investigation

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ABSTRACT
In light of the potential benefits, the flipped classroom approach has gained popularity in Indian college education, but it also has some drawbacks. This pedagogical approach involves flipping the conventional learning model, in which students individually review course materials before to class, and class time is devoted to interactive discussions and activities.The Flipped Classroom Approach's support of active learning is one of its main benefits. Prior to class, students actively engage with the subject, better preparing them for in-depth conversations during lectures. As they are encouraged to do so before asking for clarification in class, it also promotes critical thinking and problem-solving abilities.Additionally, it improves student-teacher connection because teachers have more time to answer particular queries and offer tailored advice.It also offers difficulties with regard to student preparation for self-directed learning, access to technology, and the requirement for careful instructional design. Its implementation should therefore be carefully thought out in the context of particular courses and the composition of learners. The researcher had conducted the study survey with the help of a questionnaire on 215 respondents from educational sector to know benefits, challenges and impact of flipped classroom approach in college education and the study concludes that there is significant impact of flipped classroom approach in college education. Active Learning, Flexible Learning Environment, Access to Technology and Student Resistance are the factors that shows Benefits and challenges of Flipped Classroom Approach in College Education.

Keywords: Flipped classroom approach, Active learning, Student-teacher connection, Critical thinking, Problem-solving abilities, Self-directed learning, Access to technology, Instructional design.

Introduction

In college education across India, the "flipped classroom approach" has become a revolutionary educational technique. By transferring the burden of information consumption to students outside of class, this novel approach challenges the conventional classroom dynamics and promotes a more engaging and participatory learning environment within it. While it has many advantages, including active learning and enhanced critical thinking, it also presents special difficulties that educators and

institutions must overcome in order to fully realize its potential. “Enhanced student engagement" was identified as a key benefit of the flipped classroom by Prashar (2015) in the context of operations management.Utilising "pre-recorded lectures and materials" that students may access and review prior to class was the novel technique. This made it possible for teachers to "allocate class time" for engaging "discussions" and team-based "problem-solving activities," which in turn "deepened the comprehension of the subject matter." It also brought to light several "challenges" related to the flipped classroom paradigm, though. Notably, students had to be "self-disciplined" and "motivated" to finish their "pre-class assignments." Due to their unique learning styles or prior exposure to more conventional, instructor-led learning methods, some students had trouble with this component. It emphasized how crucial it is to address these difficulties in order to successfully execute the

Lundin et al. (2018) focussed on flipped classroom analyses in higher education. They revealed that the strategy promoted critical thinking and teamwork among students while encouraging active learning. Additionally, the flipped classroom format allowed teachers to give students more individualized feedback and guidance. However, one issue brought up was the possibility for opposition from both teachers and students who were used to conventional teaching approaches. Teachers had to modify their teaching methods for the flipped classroom transition, while students had to become used to a more independent learning setting.

College students, in general, "appreciated the flexibility and accessibility of online materials" available within the flipped classroom paradigm, according to McCarthy (2016), who showed its deployment in the context of first-year higher education. Given the freedom to "learn at their own pace," students were able to return to difficult subjects as necessary thanks to this educational strategy. As it accommodated individual learning preferences and allowed students to customize their educational experiences to meet their unique needs, this flexibility was considered as a key advantage. It stressed that instructors have to put in a lot of work to "create high-quality pre-class materials." Due to the importance of these materials as the basis for student learning and comprehension, significant planning and preparation were required.A change in instructional design and pedagogical strategies was necessary to produce interesting and educational content for online consumption. The difficulties that some pupils had with the flipped classroom format is another issue. In particular, several students found it difficult to "manage their time effectively" and "stay motivated" when there was no regular lecture format. While the flipped classroom model gave students more freedom, it also increased their responsibility for self-directed learning, which presented challenges for some students who were used to more rigid college classroom situations.

Literature Review

Within the flipped classroom, Zheng et al. (2020) placed particular emphasis on "students' learning achievement and learning motivation." This method's advantages became clear as it improved "learning achievement." The flipped classroom helped students gain a deeper knowledge of the curriculum by giving them pre-class readings and moving traditional lectures to engaging in-class activities. Additionally, because students valued their active participation in their education, it had a good impact on "learning motivation." There were still issues, though, such the necessity for the right technology setup and faculty development to use the flipped model effectively.In the context of higher education, Hwang et al. (2015) addressed the idea of "seamless flipped learning". They emphasized the benefits of using "mobile technology-enhanced flipped classroom" techniques. Learning became more flexible and accessible because to this method, which made materials and resources easily accessible to pupils.

Campillo-Ferrer and Miralles-Martnez (2021) looked into the "effectiveness of the flipped classroom model" during this trying time due to the specific circumstances brought on by the COVID-19 epidemic. They were mostly interested in the students' self-reported "motivation" and "learning." During lockdowns and other constraints, the flipped classroom concept provided a way to continue teaching. Although the interactive and engaging approach to learning was said to have increased students' motivation, the abrupt switch to remote learning caused a number of difficulties. These included issues with adjusting to the new method of education, the possibility of feeling alone, and the requirement for additional help to deal with the interruptions brought on by the epidemic. According to Dogan et al. (2023) emphasized on the field of science education, the "Effectiveness of flipped classroom practices" in the setting of college education in India were found to improve students' comprehension of scientific topics. In-class conversations and experiments were made possible by the flipped paradigm, which allowed students to interact with pre-class materials on their own. Students gained a stronger understanding of scientific principles as a result. The need for instructors to select top-notch pre-class materials and adjust to a shifting educational environment, for example, became a challenge. making sure everyone has equal access to resources and technologies

Sivarajah et al. (2019), focusing on the broader context of the flipped classroom approach, showed "innovative teaching methods" across diverse educational settings. They emphasized the advantages of the flipped paradigm, such as increased student engagement, active learning, and the encouragement of critical thinking abilities. The strategy had the ability to depart from conventional lecture-based instruction in higher education in India and provide a more student-centered and interactive learning environment. However, difficulties included the requirement for faculty development and a paradigm shift in instructional strategies. Additionally, the success of the flipped classroom strategy depended on the availability of suitable technology infrastructure and fair access for all students, which might be particularly relevant in a diverse and dynamic educational environment like India.According to Brown (2020), who examined "Learning, teaching, and assessment in higher education," the flipped classroom paradigm was shown to be useful in encouraging students to engage in active learning and deepen their understanding of the material being covered. The use of pre-class materials allowed for autonomous student engagement with the material, freeing up class time for in-depth discussions and cooperative exercises. However, there were difficulties with faculty development and the necessity for extensive material creation that necessitated a lot of time and effort throughout the deployment of the flipped classroom.

Joy et al. (2023) highlighted the benefits of the flipped approach, especially during difficult times, in the midst of the COVID-19 epidemic. The pupils appreciated its adaptability and ability to support remote learning. They saw that the tactic was engaging and helpful for learning in a self-directed way. Although it was important given India's diverse educational system, challenges arose in ensuring that all students had equitable access to resources and technology.According to Navarrete and Fazal (2023), the advantages of the method in an online setting were highlighted. Flipped classrooms supported a smooth transition to remote learning, allowing students to interact with the course contents at their own pace. The need for a strong technology foundation, faculty training in online education, and measures to retain student enthusiasm and engagement in a virtual setting were obstacles, too.

According to Gupta and Yadav (2023), the implementation of the flipped classroom strategy in college education in India also resulted in certain difficulties. Faculty had to put in a lot of work, which included developing excellent pre-class materials and changing their approach to teaching. For educators, this move offered a learning curve, and effective implementation required continuing support and training.According to Indora (2023), providing students with pre-class materials and letting them

interact with the information at their own pace allows for the accommodation of a variety of learning styles and aptitudes. By enabling access to and comprehension of the subject for students with a range of backgrounds and skills, inclusiveness encourages a more fair educational experience. However, the strategy also has drawbacks, especially in terms of content generation and accessibility, as not everyone can use it.

The flipped classroom model boosts students to take responsibility for their learning through their involvement with pre-class materials, leading to more meaningful classroom conversations and activities. Sravat and Pathranarakul (2022) identified several benefits, including the enhancement of student engagement and active learning. Maheshwari and Seth (2019) emphasized on the efficiency of the Flipped Classroom Approach in the area of management education in central India. They observed that the strategy helped students perform better and comprehend management principles better.Additionally, it inspired students to grow in their capacity for critical thought and engage more actively in their studies. The development of top-notch pre-class materials and the restructuring of courses, however, needed a substantial amount of time and effort, which presented difficulties for the faculty workload. Additionally, it was stressed that in order to overcome the difficulties brought on by the flipped classroom approach, staff and students needed ongoing support and training.

Objective

1. To know benefits and challenges of flipped classroom approach in college education.
2. To know the impact of flipped classroom approach in college education.
3. To determine the factors that shows Benefits and challenges of Flipped Classroom Approach in College Education

Methodology

The researcher had conducted the study survey with the help of a questionnaire on 215 respondents from educational sector to know benefits, challenges and impact of flipped classroom approach in college education. The primary data is collected through “random sampling method” and data was analyzed by “mean, t-test, and exploratory factor analysis”

Findings

Respondent’s general details are shared in the table below where in 215 respondents, males are 61.4% and females are 38.6%. 34.4% are below 40 years of age, 39.5% comes in the category of 40-45 years of age group and 26.0% are above 45 years of age. 32.1% of them are working from less than 5 years, 42.8% are there in educational sector from last 5-8 years and rest 25.1% are working from more than 8 years.

Table 1 General Details

Variable	**Respondent**	**Percentage**
Gender		
Male	132	61.4
Female	83	38.6
Total	**215**	**100**
Age (years)		
Below 40	74	34.5
40-45	85	39.5
Above 45	56	26.0
Total	**215**	**100**
Work experience		

Less than 5	69	32.1
5-8	92	42.8
More than 8	54	25.1
Total	**215**	**100**

Table 2 Benefits and challenges of flipped classroom

S. No.	Statements	Mean Value	t value	Sig.
	Benefits			
1.	Flipped Classroom Approach's support active learning	3.21	3.133	0.001
2.	Promotes critical thinking and problem-solving abilities	3.14	2.102	0.018
3.	In flipped classroom materials and resources easily accessible to students	3.19	2.898	0.002
4.	In-class conversations and experiments were made possible by the flipped model	3.15	2.242	0.013
5.	Flipped classroom approach improves student-teacher connection	3.18	2.735	0.003
	Challenges			
6.	It is a challenge to make sure that everyone has equal access to resources and technologies	3.16	2.390	0.009
7.	Wide material creation requires lot of time and effort for flipped classroom	3.17	2.563	0.006
8.	It is tough to push student preparation for self-directed learning	3.20	3.029	0.001
9.	It requires careful instructional design	3.13	1.945	0.027
10.	Right technology setup and faculty development to use the flipped model is required	3.18	2.740	0.003

Table above is showing benefits and challenges of flipped classroom. The respondent says that flipped classroom approach's support active learning with mean value 3.21 but is tough to push student preparation for self-directed learning with mean value 3.20. In flipped classroom materials and resources easily accessible to students with mean value 3.19 and improves student-teacher connection with mean value 3.18. It is a challenge to provide right technology setup and faculty development to use the flipped model with mean value 3.18. The respondent shares that wide material creation requires lot of time and effort for flipped classroom with mean value 3.17, It is a challenge to make sure that everyone has equal access to resources and technologies with mean value 3.16 and In-class conversations and experiments were made possible by the flipped model with mean value 3.15. The respondent also says that flipped classroom promotes critical thinking and problem-solving abilities with mean value 3.14 and It requires careful instructional design with mean value 3.13. The value under significant column for all the statements related to flipped classroom is significant with value below 0.05 after applying t test.

"Exploratory Factor Analysis"

Table 3 "KMO and Bartlett's Test"

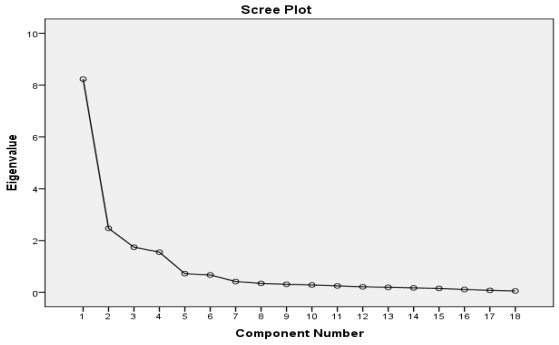
"Kaiser-Meyer-Olkin Measure of Sampling Adequacy"		.890
"Bartlett's Test of Sphericity"	"Approx. Chi-Square"	3488.740
	"df"	153
	"Sig."	.000

The value for "Kaiser-Meyer-Olkin Measure of Sampling Adequacy" found is .890.

Table 4 "Total Variance Explained"

"Component"	"Initial Eigenvalues"			"Rotation Sums of Squared Loadings"		
	"Total"	"% Of Variance"	"Cumulative %"	"Total"	"% Of Variance"	"Cumulative %"
1	8.233	45.736	45.736	4.373	24.293	24.293
2	2.472	13.734	59.471	3.387	18.819	43.112
3	1.745	9.694	69.165	3.387	18.817	61.929
4	1.553	8.629	77.794	2.856	15.865	77.794
5	.723	4.017	81.811			
6	.672	3.735	85.546			
7	.420	2.336	87.882			
8	.347	1.928	89.810			
9	.313	1.740	91.550			
10	.285	1.583	93.133			
11	.251	1.396	94.528			
12	.217	1.208	95.737			
13	.194	1.076	96.813			
14	.171	.953	97.766			
15	.155	.863	98.629			
16	.113	.626	99.255			
17	.078	.433	99.688			
18	.056	.312	100.000			

All the 4 factors explain total 77.794% of the variance. The 1st Factor explains 24.293% of the variance followed by other Factors with 18.819%, 18.817% 15.865% of the total variance respectively.



Above is the Graphical presentation of the Eigen values obtained from the Total Variance Explained table.

Table 5 Factors and Variables

S. No.	Statement	Factor Loading	Factor Reliability
	Active Learning		**.955**
1.	Active learning encourages student engagement	.857	
2.	Helps to analyze, synthesize, and evaluate information during class activities	.853	
3.	Promotes teamwork and collective problem-solving skills	.847	
4.	Improves active participation in class activities	.839	
5.	Develops good communication skills	.786	
	Flexible Learning Environment		**.887**
6.	Help students to learn anytime and anywhere	.896	
7.	Allow students to watch pre-recorded lectures	.870	
8.	Recorded lectures and materials can be reused for multiple times	.830	
9.	Allow learners to schedule sessions as per their suitability	.663	
10.	Reduces pressure on students who are shy feel questions during live lectures	.632	
	Access to Technology		**.931**
11.	Access to technology and a reliable internet connection is a challenge	.874	
12.	It is tough for all the students to have equal access to laptops, tablets, or smartphones	.872	
13.	Access to technology is financial burden on many	.851	
14.	Inadequate technological infrastructure	.833	
	Student Resistance		**.850**
15.	Students familiar to traditional lectures struggle to adapt to the flipped classroom approach	.847	
16.	Some students prefer passive learning on active learning	.832	
17.	Active engagement in class activities increase anxiety among some students	.794	
18.	Students found lack of clear communication in online class	.682	

Development of the Factors

1st factor is Active Learning and its associated variables are Active learning encourages student engagement, helps to analyze, synthesize, and evaluate information during class activities, promotes teamwork and collective problem-solving skills, improves active participation in class activities and develops good communication skills. 2nd factor is Flexible Learning Environment which includes the variables like help students to learn anytime and anywhere, allow students to watch pre-recorded lectures, recorded lectures and materials can be reused for multiple times, allow learners to schedule sessions as per their suitability and Reduces pressure on students who are shy feel questions during live lectures. 3rd factor is Access to Technology and its associated variables are Access to technology and a reliable internet connection is a challenge, it is tough for all the students to have equal access to laptops, tablets, or smartphones, Access to technology is financial burden on many and Inadequate technological infrastructure. 4th factor is Student Resistance and its associated variables like Students familiar to traditional lectures struggle to adapt to the flipped classroom approach, some students prefer passive learning on active learning, Active engagement in class activities increase anxiety among some students and Students found lack of clear communication in online class.

"Table 5 Reliability Statistics"

"Cronbach's Alpha"	"N of Items"
.924	18

Table above is showing the reliability which is 0.924 of all the 18 items that includes all the variables related to benefits and challenges of flipped classroom approach.

Conclusion

The Flipped Classroom Approach, which has advantages and drawbacks, is becoming more popular in Indian college education. The Flipped Classroom Approach's capacity to encourage active learning is a key benefit. Students are given the chance to interact with the information at their own pace by transferring traditional lectures outside of class through pre-recorded films or texts. They can do this during in-person class sessions, which encourages deeper comprehension and critical thinking abilities. Furthermore, it promotes time management and self-directed learning, two important traits for success in college and beyond. Since they must be prepared for class, students take responsibility for their education more seriously, which helps them retain material better. Additionally, it enables instructors to tailor lessons by changing classroom activities to meet specific requirements, which improves students' comprehension. However, there are certain difficulties with the flipped classroom approach. For certain children, having access to technology and a reliable internet connection might be a problem, potentially escalating educational disparities. The change may require instructors and students to make changes to their teaching methods and learning patterns, which can be difficult for both parties. Another challenge can be keeping students engaged in pre-class activities and motivated. In conclusion, the Flipped Classroom Approach has enormous potential for Indian college education since it promotes critical thinking, active learning, and self-direction. To provide fair benefits for all students, it is essential to address issues with technology access and adaption. By preparing students for a more dynamic and engaging learning environment, this strategy can dramatically improve the quality of education in India with the right assistance and integration.

The study was conducted to know benefits and challenges of flipped classroom approach in college education and found that Flipped Classroom Approach's support active learning, In flipped classroom materials and resources easily accessible to students but it is tough to push student preparation for self-directed learning and Right technology setup and faculty development to use the flipped model is required. The study concludes that there is significant impact of flipped classroom approach in college education. Active Learning, Flexible Learning Environment, Access to Technology and Student Resistance are the factors that shows Benefits and challenges of Flipped Classroom Approach in College Education.

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