International Journal of Scientific Research and Engineering Development-– Volume 2 Issue 1, Mar-Apr 2019

Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

Comparison of Flipped Classroom Approach with Traditional Classroom Environment for Undergraduate Engineering Students

K.Kanimozhi[1*], B.Raja Mohmed Rabi[2]

[1]Professor/ Electrical and Electronics Engineering, Sethu Institute of Technology, Kariapatti, Tamilnadu, India

[2]Professor/ Mechanical Engineering , Sethu Institute of Technology, Kariapatti, Tamilnadu,India

----------**********----------

Abstract

A multidisciplinary approach shall give a better idea about the teaching learning skills of undergraduate engineering students. In this paper, we have compared two engineering classrooms, one involving only engineering students of same branch learning a core paper of electrical engineering department with flipped classroom environment and the other including groups of an engineering student from a various disciplines leaning a management paper with traditional classroom handling with PPT slides as class material. Thirty five engineering students from chemical engineering branch from the individual flipped classroom and 40 students of mixed branches from the multidisciplinary flipped classroom are involved in the analysis. During the semester, first group l students were given class notes and videos before the class and then participated in weekly classes. Second group of students were taught in regular classroom environment. Students' motivational experiences and periodical test performances were assessed at the end of the semester. The results showed that student preferences in employing motivational regulation between flipped classroom and normal regular were different. Also, the students participated in the flipped classroom exhibited higher learning ability.

Keywords: Flipped Classroom, Traditional classroom, Engineering Students, Multidisciplinary group.

----------**********----------

Introduction

The latest learning methods of 21st century emphasizes student-centered learning and the use of technology in teaching[1]. Flipped Classroom is one of the latest pedagogy that gives attention to active learning through the use of technology as an intermediary in learning and teaching In contrast to the traditional method where the teacher use'chalk and talk', Flipped Classroom emphasizes learning through the student's own knowledge construction. Thus, there exists a two-way interaction between students and teachers and students. Existing traditional methods have experienced paradigm shift towards the implementation of the methods and patterns that meet the learning styles of students. Implementation of new methods, such as Flipped Classroom is to ensure balanced with the demands of the present century in education system.

The flipped classroom approach has been one of the blooming topics among faculty and students for engineering education. As it increases the interaction between faculty and students, and focuses on problem solving some consider it a s best teaching method. However some faculty and students dislike the approach because they believe that direct interactive lecturing in the traditional classroom approach is more effective. Many of the examples Education Dive[2] shares illustrate unique models of how a teacher can invert their class. The different methods are:

The Standard Inverted Classroom: Students are assigned the "homework" of watching video lectures and reading any materials relevant to the next day's class. During class time, students practice what they've learned through traditional schoolwork, with their teachers freed up for additional one-on-one time[3,4]

The Discussion-Oriented Flipped Classroom: Teachers assign lecture videos, as well as any other video or reading related to the day's subject — think TED Talks, YouTube videos, and other resources. Class time is then devoted to discussion and exploration of the subject[5]. The Demonstration-Focused Flipped Classroom: Especially for those subjects that require students to remember and repeat activities exactly — think chemistry, physics, and just about every math class — it is most helpful to have a video demonstration to be able to rewind and rewatch[6,7]. The Faux-Flipped Classroom: This flipped classroom model instead has those students watch lecture video in class — giving them the opportunity to review materials at their own pace, with the teacher able to move from student to student to offer whatever individual support each young learner needs[8].

The Group-Based Flipped Classroom: This model adds a new element to help students learn each other. The class starts the same way others do, with lecture videos and other resources shared before class. The shift happens when students come to class, teaming up to work together on that day's assignment. The Virtual Flipped Classroom: Some college and university professors now share lecture video for student viewing, assign and collect work via online learning management systems, and simply require students to attend office hours or other regularly scheduled time for brief one-on-one instruction based on that individual student's needs.

Flipping The Teacher: All the video created for a flipped classroom doesn't have to begin and end with the teacher. Students too can make use of video to better demonstrate proficiency. Assign students to their record practice role-play activities to show competency, or ask each to film themselves presenting a new subject or skill as a means to "teach the teacher"[9].

In order to test the flipped classroom approach at Sethu Institute of Technology, Kariapatti, we have chosen two groups of students. One involving only engineering students of same branch learning a core paper of electrical engineering department with flipped classroom environment and the other including groups of an engineering student from a various disciplines leaning a management paper with traditional classroom handling with PPT slides as class material.

At the end of the analysis, a student survey was utilized to collect students feedback through course exit survey. This paper presents our analysis with the flipped classroom approach, including preparation, execution, survey results, and observations and findings. One interesting observation from this trial was that students obtained higher grades in flipped classroom approach and students with medium grades or lower in the flipped classroom approach disliked the flipped classroom approach. .Also students with higher grade in the

traditional classroom approach liked the flipped classroom approach and students with medium grades or lower in the traditional classroom approach disliked the flipped classroom approach.

Implementation of flipped classroom

The authors are interested in the flipped classroom approach and wanted to implement itin one of our courses. Two group of students were chosen .The 35 students from chemical engineering branch leaning Electric drives and control for B.Tech. (Chemical engineering)were chosen as Group I. The Course Instructor for group I is Dr.K.Kanimozhi Professor/Electrical and Electronics Engineering. The multidisciplinary group of student involving B.E(Civil), B.Tech(Information Technology) and B.E(CSE) were considered as Group II.Group I was a flipped classroom and group II was a traditional classroom. The Course Instructor for group II is Dr.B.Raja Mohamed Rabi Professor/Mechanical Engineering handled the course Principles of Management .

The tools utilized for this implementation of the flipped classroom for Group I were the following:The required textbook for Electric Drives and Control was "Electric Drives (concepts and applications)",by "Vedam Subrahmaniam, Tata McGraw-Hill, 2001.We have used goggle classroom that allowed faculty to add study resources and online quizzes for students to access online. The lectures and online quizzes were posted through the goggle classroom.During the classroom hand-on activities, the instructor was able to have one-on-one interaction with a student when she had any questions. The instructor could also solve some common problems through mini lectures for the whole class when the common issues had been identified. Figure 1 shows an activity done in google class room.

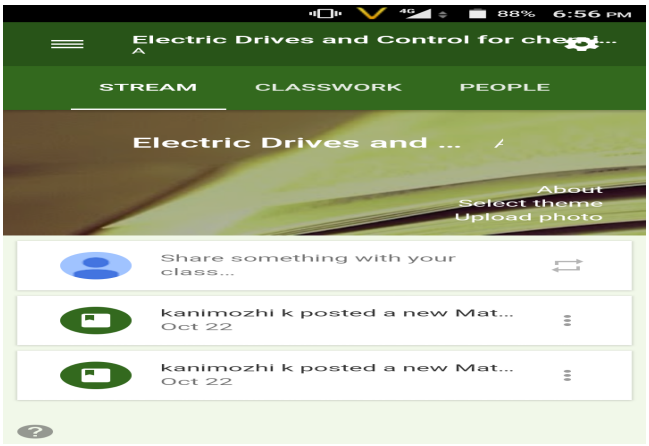

Figure 1: Google classroom activity

Following steps were used to implement the flipped classroom approach.

- Faculty involved in the trial had several meetings to discuss how to prepare and plan for implementing the flipped classroom approach. The classes were planned to be flipped throughout the semester classes.
- We collaborated and worked together to prepare lectures and online quizzes along with the associated hands-on activities.
- The definition of a flipped classroom was presented to the students. The purpose of this was to help them prepare for this new teaching format and to foster the proper learning environment for the trial.
- The detailed plan for the trail was explained and posted, which mainly included the time table of posting lectures and online quizzes.

- The lectures and online quizzes were made available to the students in google classroom . Students were asked to study the material at their own pace identified in the posted lectures. They were also asked to complete the on-line quiz before coming to class.
- Students worked individually or collaboratively during class time on the hands on activities. During class time, instructors were ready to help students as needed. If the same issues were identified during student interactions, instructors showed whole class how to solve some common problems.

For group II students involving traditional classroom approach class was handled using black board and occasionally using power point slides in classroom. The tools utilized for this implementation of the traditional classroom for Group II were the following :The required textbook for Principles of Management was "Principles and practice of Management", by "R.S.N. Pillai, Chand publications. We have used traditional classroom that allowed with blackboard and chalk. The lectures and online quizzes were posted through the goggle classroom. For both groups periodical test marks were considered for anlaysis.

Data collection and analysis

After successfully implementing the flipping classroom approach in the Electric drives and control course, a periodical test I was conducted and at the end of semester course exit survey was obtained from students.

Table 1 : Periodical Test performance

Group	Periodical Test 1 Result(%)	Periodical Test 2 Result(%)	Periodical Test 3 Result(%)	Class average of PT marks
Group I	100	100	100	85.61
Group II	95.12	85.3	100	55.87

Table 2 : Course exit survey

Group	Course exit survey (%)	Average No.of students attended regular classes
Group I	97.95	94.3
Group II	93.5	75.65

In summary, the test performance tabulated in table 1 and exit survey in table 2 shows that:
1. Flipped classroom students scored better compared to traditional classroom students
2. 75 % of students could accept this flipped classroom approach,
(2) 58.5% of students believed that they could learn at least the same material in the flipped classroom approach vs. the traditional classroom approach,
(3) 60% of students enrolled in a fully flipped classroom class.

This strongly indicated there was a place for the flipped classroom approach in higher education. The survey data also indicated that the 40 % of students in group I did not enroll in a fully flipped classroom approach course. Therefore, students should have a choice for accepting or rejecting the flipped classroom approach when they select their courses.

One interesting observation from this trial was that students obtained higher grades in flipped classroom approach and students with medium grades or lower in the flipped

classroom approach disliked the flipped classroom approach. .Also students with higher grade in the traditional classroom approach liked the flipped classroom approach and students with medium grades or lower in the traditional classroom approach disliked the flipped classroom approach.

In future after the end semester examination the result analysis has to be probed for a better insight about flipped classroom

Conclusion

As Mark Frydenberg of the Huffington Post notes, "It is not a 'one size fits all' model." He points out that every classroom is different, with different levels of access to technology, different levels of motivation on the part of the students, and different technological know-how on the part of the instructors. Additionally, teachers must re-learn how to act as the "guide on the side" rather than the "sage on the stage"—and that takes time.However, whenever the shift does occur, many experts believe the benefits are well worth the effort. Hence we flipped the classrooms and 60 percent reported increased test scores, with particular benefits for students in advanced placement classes and students with special needs; and student attitudes in classroom improved.

References

1. M. Spector, Foundations of Educational Technology. Routledge, 2012, p. 189.
2. A. Butt, "Students Views On the Use Of a Flipped Classroom Approach: Evidence from Australia," vol. 6, no. 1, pp. 33–44, 2014.
3. S. Flumerfelt and G. Green, "Using Lean in the Flipped Classroom for At Risk Students," vol. 16, pp. 356–366, 2013.
4. K. P. Fulton, "10 reasons to flip," Phi Delta Kappan J. Storage, vol. 94, no. 2, pp. 20–24, 2012.
5. N. K. Pang and K. T. Yap, "The Flipped Classroom Experience," IEEE, pp. 39–43, 2014
6. G. S. Mason, T. R. Shuman, and K. E. Cook, "Comparing the Effectiveness of an Inverted Classroom to a Traditional Classroom in an Upper-Division Engineering Course," IEEE Trans. Educ., vol. 56, no. 4, pp. 430–435, Nov. 2013.
7. D. Siegle, "Technology: Differentiating Instruction by Flipping the Classroom," Gift. Child Today, vol. 37, no. 1, pp. 51–55, Dec. 2013.
8. J. F. Strayer, "How learning in an inverted classroom influences cooperation, innovation and task orientation," Learn. Environ. Res., vol.15, no. 2, pp. 171–193, Jul. 2012.
9. J. Bergmann and A. Sams, "Remixing chemistry class: Two Coloradoteachers make vodcast of their lectures to free up class time for hands-on activities.," Learn. Lead. with Technol., no.

