Flipped Classroom Models for Conventional and Open and Distance Education Learners

V.V. Subrahmanyam
Associate Professor, School of Computer and Information Sciences,
IGNOU, New Delhi, INDIA.

Abstract : With higher education being undergoing many transformations like blended learning, learning using Open Educational Resources (OERs), Universities and other Institutions are adapting new methodologies in educational Transaction. A model is becoming much popular among conventional universities at present, namely Flipped Classroom. It is a way to improve the student engagement and active learning. The flipped classroom is an inverted classroom pedagogical in which traditional lecture and homework elements are reversed. Students engage with interactive content focusing on key concepts prior to class allowing face-to-face time for collaborative activities that clarify concepts, contextualize knowledge through application and problem solving. This model will be very much useful for the professional and technical courses.

This paper is aimed to discuss the flipped classroom approach including their benefits, pedagogy, educational outcomes along with two case examples (traditional and ODL) illustrating how this model can be implemented to engage students in active learning.

IndexTerms - Flipped Classroom, Engagement, Active Learning

I. INTRODUCTION

One of the biggest challenges in teaching is getting and keeping students excited about learning. Making courses interesting for learners of diverse skills and ability levels, knowledge bases, learning styles and modalities may be achieved through the adaptability of the flipped classroom. Hoffman-Miller (2013) credits Bergman and Sams as the "founders" of the flipped classroom initiative, as do some other education researchersThe "flipped classroom" is the term commonly defined as a pedagogical model in which traditional lecture and homework elements are reversed (Hamden et al, 2013; Lage et al, 2000). Students engage with interactive content focusing on key concepts prior to class allowing face-to-face time for collaborative activities that clarify concepts and contextualize knowledge through application, analysis, and planning and problem solving (Anderson et al., 2001; Karanicolas & Snelling, 2010; Snelling et al, 2009). Reed and Swanson (2014) assert, "Educational decision makers are now afforded opportunities for new technologies to be tested for purposes of reaching students with diverse learning styles and modalities, as well as physical challenges that previously inhibited their learning in other classroom environments." There is limited published evidence on student learning outcomes from flipped learning approaches, particularly in higher education (Hamden et al., 2013; McLaughlin et al., 2014). There is, however, well documented evidence of the efficacy of many core aspects of learning activities used in flipped classrooms, such as preparatory activities conducted prior to face-to-face sessions, higher order learning during class time, active learning and peer instruction (reviewed in Hamden et al., 2013; McLaughlin et al., 2014; Freeman et al., 2014). Consequently, the overarching aim of flipped learning is to engage students through responsive learning environments, designed to prepare and motivate them to confidently undertake assessment tasks through interactivity and feedback loops strategically embedded at all stages of this pedagogical approach. So the flipped classroom can be described as an engaging series of learning activities which are closely linked to learning and assessment outcomes that provide feedback to the learner during each stage. There are two things to be taken care. One is the designing of pre-class activities to assist students to learn key concepts in a self-paced manner, developing their confidence and motivation to engage in peer-led discussions during class that lead to synthesis and application of these key concepts. The other is the post-class assessment activities are clearly connected to pre-class and face-to-face class learning experiences and address capabilities that count, making the student's learning relevant, real and sustainable..

In a nutshell, flipped classroom is a learning environment that provides students with a variety of means to study basic knowledge content as part of homework and preparation for class meetings; teachers then use class time more effectively for hands-on activities or other means of encouraging students to practice, apply and demonstrate mastery of the content learned from the pre-class requirements. In this manner, teachers and students are collaborative learners targeting topics, threshold concepts, and other areas of learner weakness as needed to ensure better understanding of the course content. In other words, instructors make the kinesthetic-cognitive leap to learning in action in that they use class time for hands-on activities and group practical exercises. Class time is no longer a relay of information only; class is now an amalgam of discussion, listening, and doing. While no one disputes the importance of information sharing, the students and faculty both play an active role in the overall learning process.

Let us see the pedagogy of the flipped classroom in the next section.

II. PEDAGOGY FOR THE FLIPPED CLASSROOM

As per the figure 1 given below illustrates the 7-step pedagogy for flipped classroom framework suggested by Karanicolas, S. Snelling C and Winning T in their research study.

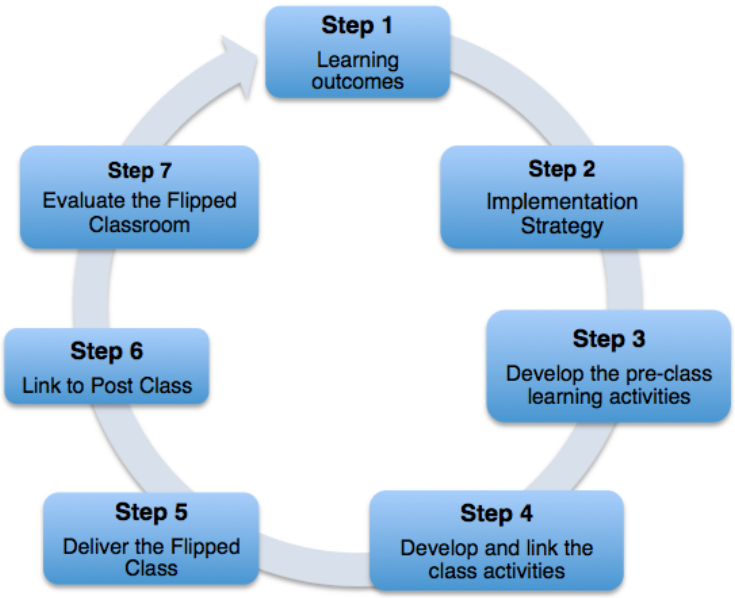


Figure1: Seven Step Pedagogy Framework for Flipped Classroom (*Source: Karanicolas, S. Snelling C and Winning, 2010*)

In the step 1 the learning outcomes for the course are identified. In the step 2, the implementation strategy depending upon the outcomes of the course is decided. In the step 3, the author has to develop the pre-class learning activities. For this, a pool of resources or Open Educational Resources (OERs) like the powerpoint presentations, online videos, podcasts, eBooks, suggested readings, articles, blogs, games, simulations, multimedia activities etc.. are suggested to the students to undergo learning activities. In step 4, the in-class activities are designed and linked to the pre-class activities to undergo deep learning experience. In the step-5 it is to deliver the flipped class. In this, the student mainly works in team to solve some problems, work on some projects, group based activities which involves the knowledge gained from the pre-class activities. In step-6 the in-class activities are linked to the post class and also to the next session pre-class activities. In step-7 the activities are evaluated.

III. ADVANTAGES OF FLIPPED CLASSROOM

The flipped classroom encompasses some approaches, including active and collaborative learning, problem-based learning and project-based learning. There are many advantages of the flipped classroom for the students as well as for the teachers too.

3.1 Advantages for Students

Following are the advantages for students:

- Learn at their own pace
- Student centric approach
- Blended mode of learning
- Collaborative learning
- Problem/practical/project based learning style
- Ample number of availability of resources for learning activities
- Engage in concepts with peers
- Particularly benefits to those students whose personality types and preferred learning styles impair their performance in traditional educational environment.

3.2 Advantages for Teachers

Following are the advantages for teachers:

- Work closely with students in the classroom
- Role of the teacher changed from sage model to collaborative model
- Can have better evaluation of the student

- Improve student attitudes
- Can form various groups and work with them
- Improve student's ability to solve open-ended problems

IV. LIMITATIONS

There are several advantages in this model, however some limitations are also exists. One of the characteristics of the flipped classroom is that everyone learns knowledge and skills at different paces. But this mode of operation relies heavily on students' self-motivation. If the pre-class learning activities assigned are not completed due to some reasons, students may not be participating actively in the classroom activities. For some students, Internet connectivity may be a problem for watching the online videos and other online learning activities.

In the next section, two types of flipped classroom approaches are presented: (i) suitable to implement in a conventional mode class and (ii) suitable to implement in Open and Distance Learning (ODL) for academic counseling. Both the models are based on the seven step based framework discussed in the earlier section.

V. TRANSLATING FLIPPED CLASSROOM CONCEPT TO PRACTICE

Two models were designed (i) Conventional Classroom and (ii) Open and Distance Learning (ODL) System

5.1 Model 1 (Suitable for a Conventional Classroom)

This model is implemented in a conventional engineering college on pilot-based study to stimulate deep learning in classroom during the teaching of Unified Modeling Language (UML) course for MCA students. The flipped classes utilizes a blended learning approach where students first watch online lectures as homework, completes the suggested reading activities prescribed in the class by the teacher and then students complete their assignments and practical work in class. You can visit the site at URL: learnuml.blogspot.in as show in figure 2.

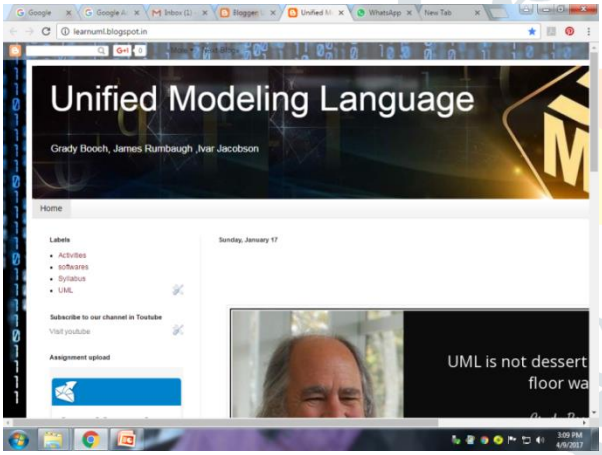


Figure 2: UML Page for Flipped Classroom

Figure 3: Pre-Class activities

In the class the teacher specifies the various learning activities like online videos (as shown in figure 3), eBooks (as shown in figure 4) that needs to be carried out by the students at home as pre-class activities.

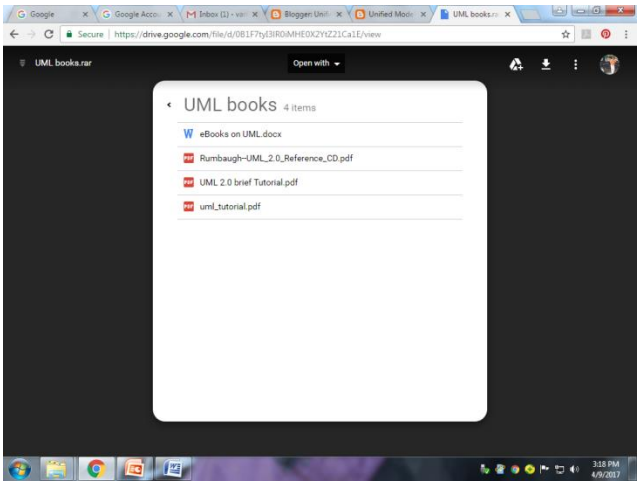


Figure 4: A list of eBooks for Pre-class activities

They have to come prepare with all the prescribed activities given by the teacher as the part of pre-class activities. In-class activities are prepared and linked with the pre-class activities. In-class learning activities include inquiry-based learning, active learning and peer-learning through solving some practical questions. They include designing class diagrams, use-case diagrams, state-transition diagrams, activity diagrams, component diagrams etc., using an open source software namely STARUML. This pilot approach is used as an action research approach to improve the in-class instructional design progressively to achieve its impact of deep learning among the students.

This approach is suitable for the flipped classroom implementation for a conventional classroom.

5.2 Model -2 (Suitable for ODL system - For Academic Counseling of a Course)

This model best suits for the needs of the ODL students. In the ODL system, students are provided limited number of academic counseling sessions for each course. The counseling schedule will be sent to the student prior by the study centre. Before attending the theory counseling session the student needs to come prepare with the Units of the course and raise doubts if any, in the counseling session on the related topics. The academic counselor clarifies the concepts raised by the students.

An attempt was done to implement the flipped classroom approach for a course of Master of Computer Applications (MCA) of IGNOU namely MCS-011 Problem Solving and Programming. In this flipped classroom approach, a blog was designed as shown in figure 5 in which the Instructional manual was placed.

This instructional manual will act as a Guide to the student. The student can go through the pre-class activities (as shown in figure 6) like Course material, online videos, eBooks, Powerpoint presentations etc., as prescribed for each session. The complete flipped approach is given in the form of a chart as shown in the figure 7.

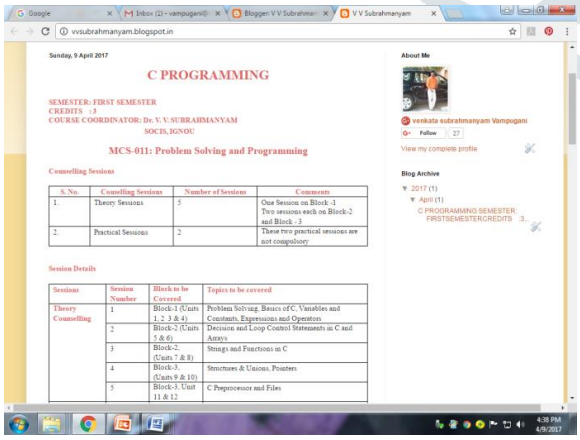


Figure 5: Blog Based – Instructional Manual

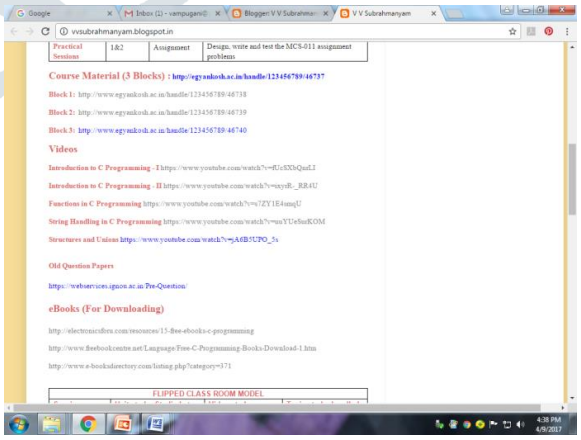
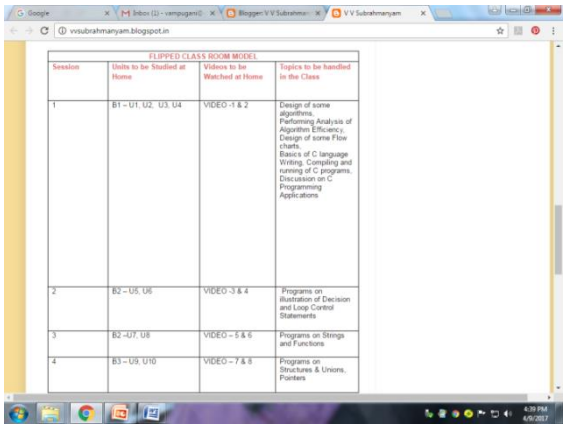


Figure 6: Pre-class Activities



FLIPPED CLASS ROOM MODEL

Session	Units to be Studied at Home	Videos to be Watched at Home	Topics to be handled in the Class
1	B1 – U1, U2, U3, U4	VIDEO -1 & 2	Design of some algorithms, Performing Analysis of Algorithm Efficiency, Design of some Flow charts, Basics of C language Writing, Compiling and running of C programs, Discussion on C Programming Applications
2	B2 – U5, U6	VIDEO -3 & 4	Programs on illustration of Decision and Loop Control Statements
3	B2 -U7, U8	VIDEO – 5 & 6	Programs on Strings and Functions
4	B3 – U9, U10	VIDEO – 7 & 8	Programs on Structures & Unions, Pointers

Figure 7: Instructions of the Pre-Class and In-Class Activities

As shown in figure 7, the table consists of the pre-class activities and also in-class activities. Student prepares as per the listing given and come to the class to attend the in-class activities.

With this flipped classroom allows students to access courseware at their convenience (asynchronously) and as frequently as needed so they can learn at their own pace; students can also easily go back to and repeat online lessons or lectures as needed. Motivated learners can view lectures, watch videos and presentations, or preview other course materials as they choose. Moreover, instructors can quickly identify unmotivated students and determine the students' difficulties with the material or other learning struggles. When the group meets either face-to-face or online, time spent together is more focused; teachers can address specific questions, problems, or threshold concepts that might otherwise preclude learners from achieving their best work. Clearly, the flipped classroom approach is student-centric and reinforces the archetype that students are ultimately responsible for their learning. Students must not only complete homework as preparation for class, but they also share ideas with peers and professors while participating in group activities. Furthermore, students are responsible for following up with the instructor for help, collaborating with peers via online discussion forums or blogs, and maintaining an active role in communicating with the group. Maintaining student accountability and active participation for all learners provides the foundation for group problem solving, project and change management, and knowledge sharing in the rapidly changing work environment of the 21st Century.

VI. CONCLUSION

The flipped classroom provides a new methodology and modality for teaching and learning, which constitutes a role change for instructors who give up their front-of-the-class position in favor of a more cooperative and collaborative contribution to the teaching process. The roles of students have a corresponding change from passive participants to positive participation. The flipped classroom puts more responsibility on the shoulders of students and gives them greater impetus in the process of learning. In this paper the author had shown two flipped classroom models. Other models can be experimented with, depending upon the type of the course the teacher wish to teach.

REFERENCES

[1] Anderson, L. W., and Krathwohl, D. R. (Eds.). (2001). A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of educational objectives. New York: Longman.

[2] Freeman, S., Eddy, S.L., McDonough, M., Smith, M.K., Okoroafor, N., Jordt, H., Wenderoth, M.P. (2014). Active learning increased student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences, 111, 8410-8415.

[3] Hamden, N., et al. (2013). A Review of Flipped Learning www.flippedlearning.org

[4] Karanicolas, S., and Snelling, C. (2010). Making the transition: achieving content connectivity and student engagement through flexible learning tools. In Proceedings of the Distance Education Association of New Zealand (DEANZ) Conference Wellington 2010.

[5] Lage, M.J. and Platt, G.J. (2000) The internet and the inverted Classroom. Journal of Economic Education, Vol. 31, p. 11.

[6] McLaughlin, J. E., et al (2014). The flipped classroom: a course redesign to foster learning and engagement in a health professions school. Academic Medicine, 89(2), 236-243.

[7] Miller, G. (2014). History of Distance Learning. Retrieved from http://www.worldwidelearn.com/education-articles/history-of-distance-learning.html.

[8] Reed, L. & Swanson, A. (2014) Servant leadership: Innovative leader development in the online classroom and beyond. . Development is Business Simulation and Experiential Learning, volume 41, 2014.

[9] Snelling, C., et al. Making the Connection: using on-line technologies to determine the learning needs of first year students in a human biology program, In Proceedings of the 12th Pacific Rim First Year in Higher Education (FYHE) annual conference, 29 June-1 July 2009, Townsville. www.fyhe.com.au/past_papers/papers09/content/pdf/11C.pdf

[10] Scott, G., (2008). University Student Engagement and Satisfaction with Learning and Teaching. Review of Australian Higher Education Request for Research and Analysis. University of Western Sydney. https://www.uws.edu.au/ data/assets/pdf file/0007/64087/Research - Scott - pdf.pdf