Implementing Flipped Classroom Instruction (FCI) in an Undergraduate Course: Lessons Learnt from Experiences of Teacher and Students

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Abstract

The purpose of the study was to explore the experiences and challenges faced by teachers and students with Flipped Classroom Instruction (FCI) for an undergraduate course at university level. The Flipped Classroom lesson plan consisted of two components: one was out-of-class component consisting of learning material for reading for students and other was within-class component involving a class quiz, class activity and the feedback/further reading task. Besides, experiences, the research study also covered the adaptations made to improve their experiences with Flipped Classroom during the study. The phenomenological research strategy was used for this research study. The data consisted of weekly reflective journals documented by class teacher and students. The reflective journals were recorded by teacher and students while working in Flipped Classroom for an undergraduate course at university level. Thematic analysis was used to analyze the data. The main challenges highlighted by teacher were related to effort and time required for planning, time management and students' guidance for shift of their role from passive to independent learner. The main challenges found in reflective journals of students were personal computers issue, electricity and internet speed issue. It is recommended to adapt to some locally useful lesson planning and classroom management techniques to enhance the effectiveness of Flipped Classroom Instruction in an undergraduate university level course.

Keywords: flipped classroom instruction, undergraduate students, independent learner, technology-integrated classroom

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Introduction

Higher Education is increasingly focusing on the quality and effectiveness of students' learning while making efficient use of available resources. For this purpose, it is necessary to provide enough active learning opportunities to students for effective experiences and better learning outcomes (Tshabalala, Ndeya-Ndereya & Merwe, 2014: as cited in Nat, 2015). It has been reported that personalized instruction can provide customized and active learning experiences for students based on unique needs of a particular individual (Davies, Dean & Ball, 2013). For making instruction personalized, it needs to be relevant to students, flexible in pace and presentation of content, and utilization of formative assessment. Therefore, innovative instructional methods may be used for personalized instruction and active learning. Traditional instruction cannot ensure the provision of these services (Davies, Dean & Ball, 2013).

Various innovative teaching methods and new technologies are now in practice at university level. The use of digital technologies in Higher Education is also challenging the stance of traditional teaching at university level by offering innovative and dynamic opportunities for teaching-learning process (O'Flaherty & Phillips, 2015). The use of technology within classrooms can automate or eliminate time-consuming tasks and assists a teacher to provide differentiated instructional services for students. Flipped Classroom Instruction (FCI) is the innovative technology-based instructional methods which effectively utilize within-class and out-of-class components for providing personalized active learning experiences for students.

In Flipped Classroom Instruction (FCI), the delivery of course content is moved out of class in the form of recorded video/PowerPoint presentation/book readings; the in-class activities are used for active and interactive instructional experiences, peer learning, problem-solving, application and development based on what is learnt in out-of-class component. In this way, the teacher-student interaction is used for developing and extending beyond what is delivered through prerecorded content (Amresh, Carberry & Femiani, 2013; Khan & Watson, 2018; Nat, 2015; Wallace, 2014). However, it is not merely inverting the traditional instructional sequence or technology integration; it emphasizes the importance of active, engaged and autonomous learners (Jenkins, Bokosmaty, Brown, Browne, Gao, Hanson and Kupatadze, 2017). Flipped Classroom Instruction can accommodate a variety of needs, abilities and interests by providing differentiated instructional services (Abeysekera & Dawson 2015; Wallace, 2014).

Active participation of students in classroom activities promoted the understanding of subject concepts (Carpenter & Pease, 2012: as cited in Nat, 2015) because active learning is often linked with concentration and deeper approach to learning which promotes student achievement (Richardson et al. (2012; as cited in Khan & Watson, 2018).

Flipped Classroom Instruction (FCI) has been researched in a variety of disciplines for its implication for students' learning e.g., Information Technology (Davies, Dean & Ball, 2013), nursing and medicine (McDonald & Smith, 2013), actuarial studies (Butt, 2014), English language learning (Hung, 2015), introductory computer program (Armesh, Carberry & Femiani, 2013) and management education (Bergfjord & Hegernes, 2016) to name a few. The implementation experiences of Flipped Classroom Instruction (FCI) is largely dependent on context-specific resources and learning outcomes. This study deals with the challenges faced, strategies adopted and lessons learnt while flipping an undergraduate course at university level within Pakistani context. It particularly focused on effort and commitment for arranging resources, flexibility and control, time management, teacher-student interaction and classroom seating arrangement.

Review of Related Literature

Flipped Classroom Instruction (FCI) suggests for flipping the content delivery component (traditional in-class component) as homework and application-based homework/exercises (traditional after-class component) as in-class component (O'Flaherty & Philips, 2015). It can also use "just-in-time teaching" to provide direct instruction for student need based on online question asked by him/her before class time (Berrett, 2012). Flipped Classroom can be accomplished in a variety of ways:

i. Half-Flipped: Half-flipped approach (Westermann,2014: as cited in Zupon,2017) provides students primary resources for study and multiple peer-peer and student-teacher online collaboration opportunities before final in-class meeting for assignment or assessment. it provides many opportunities to a student for processing content before class time.

ii. In-Class Flip: Gonzalez (2014: as cited in Zupon, 2017) explained in-class flip as the one in which lectures are recorded before class time and are available at one station in class. Students may attend lectures within class. This approach is useful for students who were absent or could not listen to lectures. It can also serve as an easy

solution to technology problems. However, the drawback is that a unit may take longer time to complete while using this approach.

iii. Total-Flip: Total-flip involves attending prerecorded lectures before class time and working on interactive class activities involving problem-solving, discussion and debates etc. (Rotellar and Cain, 2016: as cited in Zupon, 2017)

Flipped Classroom elements include learning outcomes, pre-recorded lectures, well-designed class material, in-class support and frequent use of formative assessment (Khan & Watson, 2018). Bergmann, Overmyer & Wilie (2013) have listed some key features of effective Flipped Classroom. It included (i) active learners (2) use of technology tools for instructional purpose (3) exchanging the class work and homework in such a way that homework consisting of pre-recorded lectures is accomplished first and students working on activity/problem within class time (4) class activities based real-world situations (5) class time may involve working on some problem/activity and just-in-time teaching.

As an instructional method, not all elements of Flipped Classroom Instruction (FCI) are new. In traditional classrooms, teacher gives pre-class reading assignment such reading an article or a book (Davies, Dean & Ball, 2013). It utilizes instructional technology for increased access to learning resources such as textbooks, videos, simulations (Woolf, 2010: as cited in Davies, Dean & Ball, 2013), and automation of some time-consuming repetitive tasks in traditional classroom such as checking of quiz, or attendance through class activity submitted/quiz attempted. However, the way the instructional technology is used in a FCI matters (Davies, Dean & Ball, 2013).

Flipped Classroom Instruction (FCI) can be used for missed lectures and just-in-time teaching (Roach, 2014). Besides course content, other benefits include development of communication, problem-solving (Donleavy, 2012: as cited in Khan & Watson, 2018; Nat, 2015), collaborative and team-building skills (Roach, 2014; Khan & Watson, 2018; Nat, 2015), cooperative learning Qiang, 2018) and use of differentiated instruction to customize support for students (Davies, Dean & Ball, 2013; O'Flaherty & Phillips, 2015). It can also serve as a source of intrinsic motivation due to autonomy and sense of relatedness for learners (Boekaerts & Martens, 2012: as cited in Abeysekera & Dawson, 2014), personalizing of assessment practices (Wanner & Palmer, 2015). However, it must be noted that there is a flow and variety in various out-of-class and in-class opportunities for working such as guest speakers, short lectures, different group audio-visual and individual activities, and dialogue or discussions to keep learners engaged (Graham, McLean, Read, Suchet-Pearson & Viner, 2017).

It takes a lot of time and practice to effectively implement a Flipped Classroom Instruction (FCI) for a course. Specifically, when a course is first time offered using this innovative instructional method, it needs a context-specific decision-making for online/offline resources and class activities to make it relevant, beneficial and enjoyable for learners of a particular discipline. This research study deals with the challenges, strategies and lessons learnt after implementing Flipped Classroom Instruction for a social science undergraduate course.

Statement of the Problem

The purpose of the study was to explore the experiences and problems faced by teachers and students while working in a Flipped Classroom for an undergraduate course at university level.The research paper also highlighted some strategies used by the class teacher to improve the learning experiences of students in Flipped Classroom for an undergraduate university level course.

Research Question

1. Which aspects of Flipped Classroom were considered supportive for teaching-learning process by teacher and students at undergraduate level?
2. What were the problems faced by teachers and students while working in Flipped Classroom Instruction at undergraduate level?
3. Which aspects of a classroom routine can be adapted to improve the experiences of teachers and students for using Flipped Classroom Instruction at undergraduate levels?

Research Methodology

The research study employed a qualitative research design. Data sources for this study were weekly reflective journals written by teacher and students while working in a Flipped Classroom. The duration of the study was three and a half months. There were fourteen reflective journals written by class teacher and 238 reflective journals documented by students. These reflective journals were written within the context of one undergraduate course taught through Flipped Classroom Instruction. Coding and thematic analysis was used to generate themes and draw findings of the study. In the first step, open coding was used then axial coding was done to revise and reduce the number of codes. At the end, themes were generated and the findings were discussed.

Research Findings and Discussion

Table 1

Problems Highlighted in Reflective Journals of Teacher and Students experienced in a Flipped Course

S#	Reflective Journals of Teacher	Reflective Journals of Student
1.	A lot of time is required for planning and arranging learning resources for teaching a course through Flipped Classroom Instruction (FCI).	
2.	More time than one regular class duration is required to complete a Flipped lesson. Further, time management skill of a teacher is key to success for a lesson.	Class time was perceived as short in the starting classes because the class activity was incomplete.
3.	More deliberate, comprehensive, brief and explicit instruction is required to keep students directed on task at hand.	Teacher's feedback encouraged students to perform better. Some students preferred individual and some asked for 'once for all' feedback.
4.	Students revising the topic at the start of class consumed a lot of class time.	It was time-consuming for students to understand a topic clearly on their own.
5.	Pair class activity or individual activity are more difficult to manage and coordinate for a teacher.	Individual activity is difficult to complete within given time. A student has to do a lot effort to successfully complete an activity because nobody is there to support or share responsibility/effort.
6.	Majority students preferred videos over PowerPoint presentations. However, a few students were having problem with accent and fast instruction used in the videos.	Two students had difficulty in understanding the concept because videos had with fast verbal instructions and different accent than that of students.
7.	There was some technical issue with personal computers in some classes.	There was technical issue faced with few personal computers in some classes.
8.	Slow internet speed and electricity problems were faced during some classes.	The internet speed was slow and there was no electricity in some classes.
9.	The seating arrangement used in a traditional classroom was not ideal for a Flipped class.	There must be special seating arrangement for a Flipped lesson different from that of a traditional classroom.

The table 01 shows the issues highlighted in reflective journals of teacher and students. It can be observed that there was a consensus among teacher and students for majority of the problems of a Flipped class i.e., class time, time consumed in students' revision at the start of class, concern of some students for videos as a mode of learning, internet/personal computers/electricity problems and seating arrangement of classroom. However, there was a difference in nature of concern in journals of teacher and students regarding class activity and teacher's feedback/instructions. Teacher's reflective journal contained one more aspect which was related to plenty of time required for planning and arranging resources for a Flipped lesson.

The detailed findings for the issues mentioned above and strategies for adopted for dealing with these issues are given below.

1. *Effort and Time for Planning and Arranging Resources for Course:* As the teacher was, for the first time, teaching an undergraduate course through Flipped Classroom Instruction, it took a lot of time for arranging resources and planning lessons for this course. Teaching a course through Flipped Classroom Instruction for the first time requires more deliberate time and effort to arrange online and offline resources, and to plan quiz and activities for each topic (Graham, McLean, Read, Suchet-Pearson & Viner, 2017; Nat, 2015). Once these resources are arranged for a course, then it could be updated with comparatively less effort for upcoming semesters.

Littlejohn and Pegler (2007: as cited in Nat, 2015) has discussed a number of issues related to privacy and confidentiality of online resources and communication. The online platform used for this study was password-protected and only instructor can enroll new students in the class. Besides this, an online resource was shared with students along with the web address from where it was obtained.

2. *Flexibility, Autonomy, Responsibility and Control*: The role of teacher involved arranging online/offline resources for asynchronous learning of students and managing in-class time for application-based tasks. The course allowed for flexibility and autonomy for students for preparing for a topic at their own pace within due date, before coming to class (Davies, Dean & Ball, 2013). A student also had control over activities and group partnerships. Greater control of students on activity or context leads to greater student engagement (Graham, McLean, Read, Suchet-Pearson & Viner, 2017). However, every student was bound to achieve learning outcomes for a lesson.

The students were responsible for coming to class prepared for a topic. In the first-half of the study, it was very challenging for instructor to ensure the practice of this culture. But persistent follow-up of a classroom routine played an effective role for developing the habit of students for preparing a topic before coming to class.

Attempting quiz before class activity ensured that students have understood the concepts before applying it. DeLozier & Rhodes (2016) mentioned testing as an effective learning strategy. The use of objective type items was practiced because these items were auto-checked by the system when answers were entered beforehand. The marks earned for quiz also served as source of motivation for students. The students studied carefully before class time because they knew that they had to score well in quiz before proceeding to class activity. They also worked to improve their quiz marks by re-studying the material and reattempting the quiz in case, they did not score well first time.

One beneficial aspect of Flipped Classroom was that high achievers did not have to wait. Every student was moving at his/her own pace for achieving the lesson objectives; nobody is left behind. The students who were absent, can check for resources, attempt quiz and activity through online platform. The student could access teacher when they needed some help otherwise they might study material on their own. However, this flexibility of class routine needed organizational skills and capacity of independent learning on the part of students (Graham, McLean, Read, Suchet-Pearson & Viner, 2017). In the beginning, the students required a lot of directions and assistance from their teacher for progressing further. It took almost half of this study time period to train them for this flexible arrangement. It also required the teacher to be flexible in kind of activities for students while making the course more relevant and understandable for them.

Group activity was preferred by students as compared to individual activity because it helped them to share responsibility and learn from each other. It was found by Forsey, Low and Glance (2013) that engaged and variety of learning experiences along with peer learning enhanced students' knowledge.

3. *Time Management:* The Flipped lesson plan for a topic had two components: one component was out-of-class with reading material (video/notes) for studying at home and second one was in-class component involving a class quiz, activity and feedback to students by teacher on that activity. The students studied the lesson content without

any time limit. They were allowed to revise the topic material before attempting class quiz. For in-class components of lesson plan, time management was a major issue during the study period. It was experienced by the teacher during first class that regular class duration was not enough to complete a flipped classroom lesson. Therefore, two consecutive classes were arranged to execute in-class components of flipped classroom lesson plan for the rest of the semester.

It was a new experience for students to work in a Flipped Classroom, so it took almost one and a half month to adjust to this new routine involving Flipped Classroom. While having two consecutive classes for a lesson, the students were still not able to complete the activity within given time during the first three classes of the semester. It may be due to the reason that in traditional classroom, the students usually do not perform activities based on the subject concepts. So, the teacher planned relatively shorter lesson plans by dividing topics into sub-topics, planning lessons for sub-topics, and arranging short/simple activities during the first half of the semester; in this way, the lesson plan can be completed successfully in one class otherwise it would affect the pace and quality of lesson plan and students' learning progress.

A Flipped lesson plan with sufficient time allocation for each component is very important to cover a topic effectively and efficiently. Besides this, giving students time limits for each step of activity helped to train them for its timely completion. In the first-half of the semester, students needed time and support to adjust to new class routine. After almost second-half of the semester, giving time limit for steps of an activity was practiced when students were adjusted to this routine.

4. *Teacher-Student Interaction:* Technology tools can assist a teacher in teaching-learning process for effective delivery and management of learning material and activities. However, it can never replace a teacher. The provision of learning material in the form of videos/PowerPoint presentation was supplemented by online availability of teacher to answer a question when asked by a student. The periodic availability or pre-decided time can be a time-efficient option for this question-answer session. This activity can be synchronous as well as synchronous in nature.

While providing resources for upcoming class, a teacher can provide a 2-minute short summary of topic for students. It would assist them to understand material while studying it by themselves at home. Further, the students required a revision of topic before attempting class quiz during

the start of the class time. For this purpose, they may either revise the learning material by themselves or listen to teacher's summary of topic. The teacher experienced that instead of letting students to revise material in class before quiz, if teacher summarize it then it will be more beneficial and less time-consuming. As a result, class time can be effectively used for activity. Students also recommended a short summary by teacher at the start of class time. So, the best strategy would be that the students must be given resources/videos for in-depth study of a topic at home, and the teacher presents the summary of lecture in class time for more clarification.

It was experienced by teacher that a more deliberate, brief and explicit instruction is required to teach students about how they can apply a particular concept they have learnt, in a class activity. According to students, it gave them the main idea of the topic so, they were able to understand the learning material more effectively. After first lecture, when the activity was provided to students, none of them was able to complete it successfully and gave up. Then the class teacher completed that activity by explaining about each step and way of doing it. As the students were first time practicing a class activity thatswhy they were unable to do it. Further, unnecessary explanation and details of a topic/class activity might confuse a student. Application of a concept during class activity required more comprehensive and explicit instruction. However, when the teacher guides students for this track, their learning is ladder-like. They progress well while attempting class activity. Therefore, brief and explicit instruction would serve as a tailored support for students for learning course concepts and completing class activities.

It was found that classroom interaction was helpful for students' understanding of course concepts (Kim, Kim, Khera & Getman, 2014). According to students, teacher's feedback on their performance for a class activity/quiz encouraged them to perform better. There was a mixed response of students on how the teacher might provide feedback to them. Some students asked for providing feedback to every student individually whereas some students wanted feedback once for all. So, the teacher provided individual or collective depending upon the nature of task. Some activities demanded collective feedback to class at once whereas for some pair activities, the feedback was provided to every student individually.

5. *Classroom arrangement:* Seating arrangement like a traditional classroom would not work for Flipped Classroom.
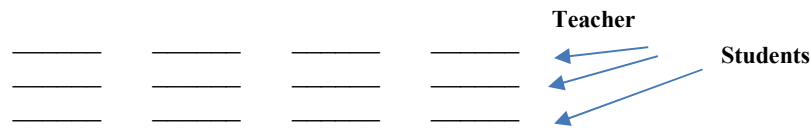

Figure:1 Seating Arrangement of a Traditional Classroom

If the seating arrangement of a classroom is like as shown in figure 01, then the seats must be rotated for students so that back-benchers may get a chance to sit on front seats. During this study, the students sitting on back-seats complained about it. However, most of the tasks they do independently, the rotation will not benefit them a lot. Special classroom arrangement with computer on one side and activity on other side might work well so that the students who complete quiz earlier move for individual/group activity without disturbing other students. Because for class activity, students need instructions about procedure of class activity. Further, if there is a group activity, there will be noise/communication between group members and the students doing quiz might be disturbed. So, it is better to allocate separate sections for reading topic material/quiz and working on class activity. For example, a horse-shoe or L-shaped seating arrangement might work well for a Flipped Classroom.
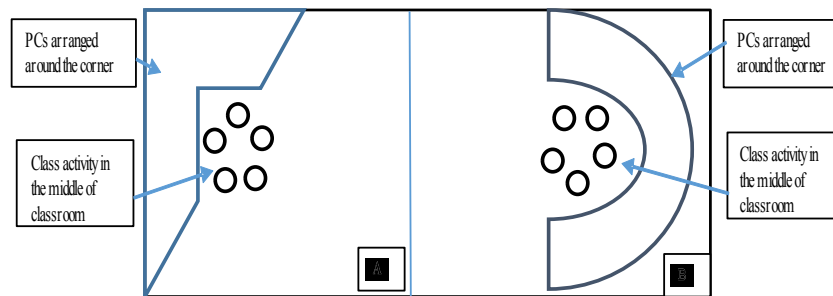

Figure: 2 Recommendations for Seating Arrangement for a Flipped Classroom

The seating arrangement shown in fig. 02 can be used in a Flipped Classroom. It could not be implemented for this course because table frames of personal computers were fixed on its places and immovable.

6.   *Accessibility and Use of Technology Tools:* Videos were preferred by the students as compared to other formats for learning material. Multimedia was helpful when one issue/problem was faced by a number/majority of students; in this case, the teacher can explain it through multimedia instead of visiting each student's desk one by one. Technology saves a lot of time but it requires a regular checkup and maintenance preferably before the class time as mentioned in the reflective journals of teacher and students, as mentioned by Jensen, Kumer & Godoy (2015) that maintenance of technology is an ongoing cost. There were also light and internet speed issues for some days so, the alternatives used in this course included mobile phones and Bluetooth. When there was some hardware or internet issue, the students shared learning material with each other through Bluetooth or by sharing android phone/PCs. When there was no light, the students used their phones to study (all of the students had android phones with them). Besides this, multiple internet devices i.e., 14 devices, were used during class time, so if there was internet speed issue with on device, the personal computer or phone can be connected with another available device.

Conclusion

The research study discussed the challenges and lessons learnt for using Flipped Classroom Instruction (FCI) in an Undergraduate Pakistani Classroom based on the reflective journals of teacher and students involved in it. The findings of the study suggested that although FCI is interactive and beneficial instructional method, its first time requires a lot of effort and commitment on the part of teacher. Giving some autonomy and control to learners during class activity can enhance the engagement and interest of students in the class. The problems faced in time management and maintenance of technology tools can be effectively dealt with some adjustments for future use and experience. FCI may be treated as a continuous method of teaching, rather than a on/off switch (Bergfjord & Heggernes, 2016).

As this study is based on a social science subject, the experiences of implementation of FCI in other subjects may be different and

investigated. This course involved an average class size (below 30), the effectiveness of FCI in over-crowded classes may be researched. The future researches on Flipped Classroom Instruction may assess the effect of FCI on drop-out rate of students in a class.

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