



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## Student Learning and Perception in Teaching of Science/ EVS through Flipped Classroom

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### ABSTRACT

With the advancement in the field of Science and Technology, the nowadays Classroom scenario is also changing bringing about drastic advancements. The main aim of today's Education is to provide the students best Learning Outcomes and in this Technology is aiding a lot to achieve this goal. Moving from the age old methodologies used in Science Teaching like Lecture Method, now the Teacher is too smart to overcome the barriers coming in her ways and in fact using technology in Education as well as For Education. Flipped classroom is one such instructional pedagogy which has turned the table around and moving progressively. Flipped classroom approaches remove the traditional transitive lecture and replace it with active in-class tasks and pre-/post-class work. While flipping the classroom sounds quite effective and functional in one sense and do promise of improving the learning outcome but very little research has been evident on the effectiveness of using Flipped Classroom on the learning of the student. This study aims to draw out the challenges and prospects in learning of Science / EVS effectively through flipped classroom used by D.El.Ed. Trainees who employed this methodology in their classrooms during their School Experience Programme (SEP) whereby the trainees initially used the traditional methodology (like Lecture Method etc) and later on shifted towards flipped classroom. This study involved responses of 166 D.EL.ED. Teacher Trainees regarding the challenges they faced while employing this methodology as well as their perception on use of flipped classrooms in Govt. Schools of Delhi. Student's understanding and perception were examined through a Questionnaire which acted as both Pre-Test as well as Post-Test.

**Keywords:** Flipped Classroom, Technology in education, School Experience Programme, Learning Science, inquiry-based learning, student perceptions of instruction.

## INTRODUCTION

The idea of the “Flipped Classroom (FCR)” is relatively a new concept for many in the field of Education which is becoming trending day by day. With the advancement in the field of Technology, the trend of Flipped Classroom has shifted to the current classrooms whereby the Teacher flips the classroom leading to reversibility of the School Work and Home Work. With this concept, the student actually does homework in the classroom and the classwork at his/her home.

What happens in a Traditional Classroom model is that the Teacher performs the primary role as an Instructor in the class by being active whereas the student remains passive. At school, in the Traditional Model, the Teacher delivers the lecture followed by Didactic Teaching and assign homework whereas at home, the student completes the Home task on his own. But the Flipped Classroom inverts the Traditional Teaching Methods by delivering instructions through Online/Offline content outside of Class and moving homework into the classroom. Hence in the Flipped Classroom Model, the student views instructional videos before coming to the class as a result of which student will be prepared for next/ tomorrow’s class and complete quick assignments so teacher can gauge understanding. At school, the classroom time is for focusing on concepts, problems and quizzing alongside reflection and even teacher can offer one-on-one help to their students. Thus the teacher’s role shifts from being an instructor to a facilitator.

Now the question arises that why we are flipping the classroom? The answer to this question is quite simple that by flipping the classroom we can focus on improving Learning Outcomes of students by exposing them to video content suiting the requirement of the child. Another reason for flipping the classroom is to move away from “One size fits all approach to personalized learning” and to create a repository of indigenous teacher created videos which are highly creative that would invoke critical thinking, inquiry based learning and project based learning in a child. Many misconceptions are still prevailing in the society regarding Flipped Classroom. One such misconception is that many educators think that the student will spend his/ her entire time in front of the computer at home while some other thinks that the video/s has taken over the role of the Teacher. Looking at the actual situation, one should try to understand that it is not an online course and rather in Flipped Classroom Model, the time which was earlier used to be spent on lecturing is being utilized for in-class activities, discussions and problem solving. Hence in FCR, initially the student learns on their own and when they come into the classroom, they learn with their peers.

Hence, it won’t be wrong to say that the opinions in the Educational Community regarding FCR are mixed. Some think it to be future standard of Educational Technique (Bergmann, Overmyer and Wilie, 2012) whereas another group of educators consider it to be ineffective and undesirable form of Education (Bergmann, Overmyer and Wilie, 2012).

### Key Elements of FCR:

- Provides an opportunity for the student to gain first exposure prior to the class.
- Provides an incentive for student to prepare for the class.
- Provides a mechanism to assess student understanding.
- Provide in-class activities which focus on higher level cognitive activities.

Hence FCR is an educational model in which the traditional lecturer and homework elements are inverted or flipped. It provides an opportunity for students to read/view the content at their own pace and on their own time before the actual class. The FCR has stronghold in both the Constructivist and Social Learning Theory as it encourages students to view the process of learning as an active and social process. Therefore, in FCR, student receives continuous guidance from their teacher, are allowed to use their “Learning by Doing” experience to help construct, organize and support their own knowledge and educational advancements.

### **Advantages of Flipped Classroom:**

There are a number of advantages to this method:

#### **1 More one-to-one time between teacher and student**

A flipped classroom dramatically increases the amount of time you have to spend with each student. It also create a platform for them to ask questions or seek extra help with an area they’re finding challenging.

#### **2 More collaboration time for students**

The project-based work that now takes place in the classroom need not be on an individual basis. A flipped classroom enables students to spend more time collaborating with one another: not only a great way to learn, but also good for their team working skills.

#### **3 Students learn at their own pace**

Because ‘knowledge acquisition’ now takes place outside the classroom, each student can control it to match their own personal abilities and appetite. A traditional classroom instruction-based method relies on every student absorbing and understanding at the same time and pace. Flipped learning doesn’t. This can be particularly liberating for slower learners. No longer do they feel the burden of having to ‘keep up’; they’re free to learn in a way that works for them. And if they want to go back and study something again, they can.

#### **4 It encourages students to come to class prepared**

After students have engaged with digital content at home, they can come to the classroom prepared with ideas and questions. It’s a great way to involve students in shaping the classroom sessions, and thereby nurture their sense of responsibility.

## **5 Practical things – like missing class due to illness – become less problematic**

It used to be that, if a student missed a lesson, they missed learning something. Not with flipped learning. Because students engage with a lesson on their own time, and away from school, absence need not detract from them learning the material.

## **6 Subject matter content becomes infinitely richer**

Previously, students were only exposed to one source of information on a topic: that which the teacher gave them in class. With flipped learning, they can explore much more. They can access multiple sources, and equally you can direct them towards sources from other teachers, and more. This diversity will only increase their comprehension of the subject.

## **7 Its cost-effective!**

Because students use their own devices to access content, there's no need for a school to invest in hundreds of new computers or classroom gadgets. The only thing you now need to give: more of your personal time and attention.

## **Disadvantages of Flipped Classroom:**

The following are the disadvantages of the Flipped Classroom:

### **1. Relies on student preparation**

The flipped method does rely on students preparing for their classes ahead of time. If the student is already a social loafer then this method will mean they don't complete their own work or learn.

### **2. Increased screen time**

Due to the nature of the research, activities and discussion required, computers or tablets tend to be used more using the flipped teaching method. This can add to an already high screen time in students.

### **3. May exacerbate digital divide issues**

Lack of access to the internet or a home computer can result in a lack of access to the learning materials provided. This may exacerbate digital divide and learning issues already caused by students coming from lower income families.

### **4. Time and effort for teacher**

The time and effort required from a teacher's perspective initially when creating the flipped class material is higher than for a traditional class. However, the material can be re-used the next year.

## 5. May not cover everything required for a test

Students in flipped classes may not cover the entire subject required for a test. The depth of the subject can be dictated by the student themselves or the group the student is working with.

## REVIEW OF LITERATURE

The flipped classroom is considered a recent idea in the education field. The most commonly cited creators of the flipped model are Jonathan Bergmann and Aaron Sams when they flipped their high school chemistry classes in 2007 (The Flipped Classroom 2011). Though not commonly practiced before, some of the fundamental concepts of the flipped classroom have been around since the 1990's (Lage 2000).

Some of the findings from research conducted thus far would indicate that students have a positive association with the flipped instruction (Herried 2013). For example, Zappe (2009) flipped a college architecture class and Ruddick (2012) flipped a college prep chemistry class and both found that students perceived the flipped instruction as a better or more efficient method of teaching. Additionally, Chester (2011) found that a flipped classroom improves student behavior.

In regards to improving student content knowledge, the findings in one recent research study have allowed researchers to indicate some improvement in student learning and total comprehension. Ruddick (2012) taught a college prep chemistry class and the research findings from this study indicated improvements in students in the flipped class's scores compared to student scores in a traditional classroom. He showed that not only was the average student score higher in the flipped class, but the percent of students performing at or above a C level on the exam was greater in the flipped class.

## METHODOLOGY

### Purpose:

The purpose of this research was to add to the body of knowledge and help provide data to investigate how well students learn Science/ EVS content by using FCR and to identify Student's Attitude towards FCR. Moreover the purpose of the Study was to find out the awareness level among the Pupil Teachers regarding FCR.

### Sample:

The sample of this research was 230 Pupil Teachers and 100 Students of Govt. Schools of Delhi.

### Tool of the Study:

A Questionnaire was formed to know the awareness about FCR. The questionnaire comprised of 3 Parts to check on various grounds. The pretest and posttest was also taken to know the effectiveness of the Flipped Classroom. Video lectures were used for the students.

### **Procedure of the Flipped Classroom:**

One period was randomly assigned to participate in the treatment group as the class to be flipped. To implement flipped instruction, video lectures were recorded ahead of time by the instructor and uploaded for public viewing on YouTube. These lectures involve the teacher presenting information with visual graphics and real-life examples of the concepts being studied. The videos were specific and cover one or two concepts at a time.

The students were notified of which videos to watch by the teacher announcing it in class. Students in the flipped class were required to watch the video lectures at home before coming to class the next day. To help track which students watched the videos for this study, students were required to take an online quiz after watching the video and were allowed to use any notes they had taken during the video, which encouraged better note taking during the video lecture.

The two primary purposes of the online quiz taken at home is to more accurately record which students had completed the video lecture prior to class, and to help motivate students to watch the video before coming to class.

### **RESULT ANALYSIS/FINDINGS**

The purpose of this research was to provide data to investigate how well students learn Science/ EVS content by using the flipped classroom and to identify students' attitudes towards the flipped classroom. Class periods were randomly assigned into one of two groups by flipping a coin: the control group with a traditional instructional approach, and the treatment group that participated in the flipped classroom. The traditional group was taught using primarily guided inquiry with some direct instruction. The treatment group was taught by watching video lectures that were prepared by the instructor before coming to class, then participating in classroom discussions about the content covered in the video and doing their homework with a partner or small groups with the teacher present to help if needed.

The first research question asked if there would be a statistically or practically significant difference in mean test scores between students participating in a flipped classroom vs students in a traditional classroom. Each test was analyzed individually to determine if there was any statistically or practically significant difference in means between the control group and treatment group.

The second research question asked if student attitudes towards their science/EVS class and their learning style would be statistically or practically different. At the end of the experiment, a Questionnaire was given to each student.

Advances in media technology over the last decade have made it much easier for teachers to flip the classroom by having students view video lectures before class and then perform their homework with the teacher as part of their classroom activities. Despite the current popularity of this teaching approach, there has been comparatively little empirical research conducted to determine its effectiveness in teaching school students. The purpose of this research



was to investigate (a) the effectiveness of using the flipped classroom with technology class and (b) identify students' attitudes towards the flipped classroom. It is conclusive that in situations like the one in this experiment, students in the flipped science/ EVS class performed equally well as students in the traditional inquiry-based class

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