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Flipped Learning: An Innovation in Education for the 21st Century

Dr. Subrata Ghosh
Assistant Professor and Teacher-In-Charge, Yeaqub Ali B.Ed College, South 24 Parganas

Abstract. *Today's education is heavily based on technology. Advances in technology have shaped the current education system. Flipped learning pedagogy is one of the most important educational technological discoveries of the 21st century. In the flipped classroom, students are given digital materials before the lesson, students try to understand the concepts and doubts arise, the teachers solve them during the following lesson activities. This study discusses the concept of flipped learning, the four pillars of flipped learning, the theoretical basis of flipped learning, its effectiveness and the positive and negative aspects of flipped learning.*

Key words: *Flipped Learning, 21st Century, Technology in Education.*

Introduction:

Flipped learning is a pedagogical method where lecture materials and presentations are given to students to watch at home or outside the classroom, so that the teacher and students can participate more actively in class interaction. In a flipped learning model or flipped classroom, students are provided with digital learning materials in advance that allow them to research and review the subject before attending a physical class. Therefore, when students participate in a physics classroom, they gain a thorough understanding of the material presented. (Yousufi, 2019; Iyer, 2019).

Flipped Learning is pretty extraordinary from conventional lecture room learning. In a traditional lecture room n setting, the trainer offers a lecture to the scholars whilst status on the front of the elegance and records some key factors on a blackboard. In that process, the scholars get busy in taking notes and n expertise the idea properly. And as a result, each pupil does now no longer apprehend really the subject of the session. Remarkably, the trainer is completely cognizant of the reality that most of the novices fail to understand the n middle idea. However, because of the confined elegance duration, he's not able to offer customized interest to every pupil (Alsobaie, M.F. 2018 p.15). Even the following day, the trainer would not have time to reply to the questions from the day before today due to the fact they needed to maintain the elegance plan. This form of situation is not unusual place in nearly each instructional organization internationally and an extreme depend for educators n (Alsobaie, M.F. 2018; Graziano 2016, p.16).

Bishop and Verleger (2013) define flipped learning as "an educational technique that has two parts. One part is interactive group learning in the classroom and the other is direct computer-based individual instruction outside the classroom."

In a broader sense, the flipped classroom is an environment where students are responsible for their own learning and this process increases interaction and communication between students and teachers (Subramaniam and Muniandy, 2016; Bergmann and Sams, 2012). When students are engaged in learning, the teacher acts as a "facilitator" (Subramaniam and Muniandy, 2016; Baker, 2000).

History

Early in the new millennium, chemistry instructors Jon Bergman and Aaron Sams (Bergmann and Sams 2012) as well as Salman Khan (TED 2011), the creator of the Khan Academy, popularized the term "flipped learning." Flipped learning, however, has a considerably longer history than this. Harvard Professor Eric Mazur created the "peer instruction" concept in the 1990s. Using material that students were expected to read and consider prior to class, he then used class time to promote deeper cognitive thinking through peer interaction and teacher challenge. "Just in time teaching" was the term he used for this (Crouch and Mazur 2001).

Technical components were eventually added to this model. A talk titled "The Classroom Flip: Using Web Course Management Tools to Become a Guide by the Side" was given in 2000 at the International Conference on College Teaching and Learning (Baker 2000). It expanded upon the idea of the "flip" and highlighted the function of learning management systems in providing students with information ahead of time. It was important to describe the teacher's role as a coach and facilitator, or as a "guide on the side." In order to create an inclusive learning environment where individualized coaching and mentoring were the norm, later research concentrated on the concept of "inverting the classroom" (Lage Platt and Treglia 2000).

Today, with online content creation, collaboration, and distribution capabilities growing at an exponential rate, practitioners have an easily available arsenal at their disposal for implementing flipped learning. Flipped content may be easily created with the help of video creation tools like Screenr and Webinaria and distribution solutions like Vimeo and Youtube. Alternatively, a plethora of pre-existing media can be utilized again (e.g. Open Yale Courses and iTunesU Khan Academy). Flipped text-based content is equally as beneficial as video content, thus technology is not a must. However, there is no denying that the combination of web 2.0 technology and learning theory has made flipped learning a useful addition to the blended learning spectrum.

Concept of Flipped Learning

An educational strategy known as “flipped learning” turns the conventional notion of classroom-based learning on its head. Instead of having students study the content in class, they are introduced to it beforehand and utilize the time to further their understanding through peer discussions and teacher-led problem-solving exercises.

Teachers need to be well-versed in the theoretical underpinnings of flipped learning in order to fully grasp the complex concept of this technique. As a result, it helps them apply the flipped learning strategy in the classroom effectively. Blended Learning Theory (BLT) and Project-Based Learning Theory (PBLT) are the two theoretical underpinnings that Cheryl and Stephen (2013) discovered as the basis for flipped learning.

a) Theory of Blended Learning: The blended learning approach is an instructional strategy that combines online learning and computer-mediated activities with traditional in-person training. There are a number of issues with online learning, such as little student-teacher connection and low student feedback. According to blended learning theory, learning online can be less challenging. Here, there is a chance for direct communication between educators and pupils. Teachers need to be well-versed in mixed learning theory as a basis for flipped learning.

b) Project-Based learning Theory: An educational strategy known as "project learning" places a high value on pupils actively participating in a task or project. Students that participate in project-based learning take solo or group actions to solve certain problems. The educational approach of flipped learning is founded on the fundamental idea of project-based learning.

In their study "A framework for Flipped Learning," Eppard and Rochdi (2017) identified three theoretical underpinnings of flipped learning: constructivism, mastery learning, and bloom's taxonomy.

i. The Taxonomy of Bloom: B. Bloom and his associates established the taxonomy of educational aims in 1956 (Lin, Y. 2021). Six categories were created by Bloom and his associates: recall,

comprehend, apply, analyze, evaluate, and create. This framework is frequently shown as a pyramid with several learning levels on it. One of the pillars of the flipped learning concept is Bloom's taxonomy. Bloom's taxonomy denotes different learning levels. Students can complete the learning at the base of the pyramid without assistance from teachers. These kinds of instructions are referred to as pre-class in the flipped learning paradigm. Since these are simpler than higher level learning, it is anticipated in a flipped classroom that students may complete them before class. More help is needed at the upper tiers represented on the pyramid. Bloom's taxonomy classifies flipped learning activities as higher order learning.

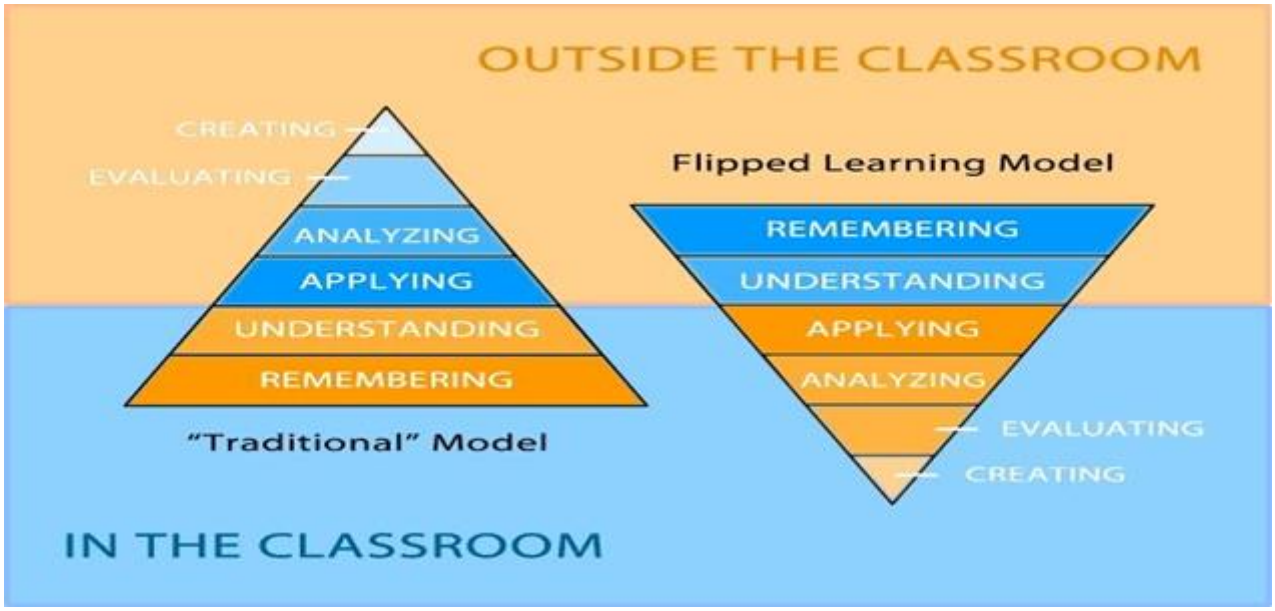

Figure: 1- Use of Blooms' s Taxonomy in Flipped Learning Model

ii. Constructivism

According to constructivist learning theory, students actively create new information by drawing on what they already know and have experienced. It is safe to conclude that children learn best when they are able to comprehend an idea on their own. Teachers can help students understand concepts more deeply if needed. According to Vygotsky, learning is a cooperative process in which students get assistance from more experienced and skilled teachers in order to gain new skills.

Learning, in accordance with Vygotsky, happens when students work with a more experienced individual to address learning challenges that lie just outside of their own capabilities (Epparld and Rochdi, 2017, p. 36). This fundamental idea can be applied to the flipped learning paradigm. In this case, the students receive an assignment and view informatic video lectures outside of the classroom. Students attempt to complete the assignment in groups or individually in the classroom, and the teacher steps in as a supervisor if needed.

iii. Learning by Mastery

Benjamin Bloom popularized the idea of mastery learning in the 1960s. The fundamental tenet of mastery learning is that each student must acquire a well-organized goal. Remedial instruction is necessary when a student does not master a subject. Many experts agree that the foundation of master learning is flipped learning. According to Bergmann and Sams (2012), master learning facilitates flipped learning since flipped learning is student-centered, asynchronous, and offers useful feedback and correction. Students that take part in flipped learning have the freedom to learn independently, at their own speed, and on their own schedule.

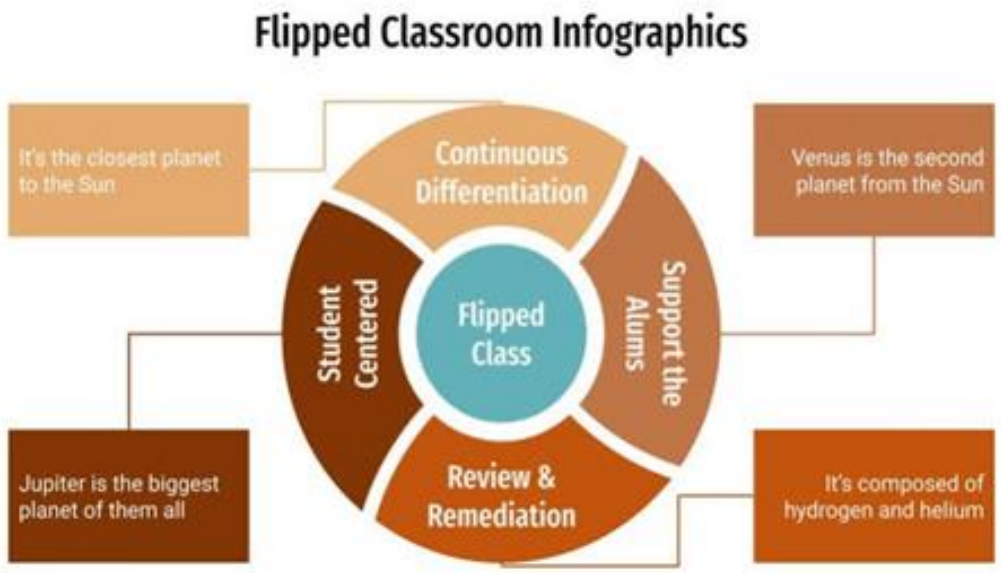

Figure: 2 – Flipped Classroom Infographics

Characteristics of Flipped Classroom

We should begin by contrasting the flipped classroom with a **traditional classroom** in order to gain a better understanding of what it is all about:

1. The instructor, as the primary knowledge source, directs the class.
2. Instructors respond to queries from their pupils and offer criticism.
3. The tutor assigns assignments and modifies the conversation's course.
4. The primary goal of the students is to comprehend the new material.

5. The range of jobs available for completion at home is restricted, and most of them must be completed alone, with no chance for teamwork. 6. Reading from a textbook or working on practice problems outside of the classroom are common components of traditional learning.

On the other hand, a **flipped classroom** has the following features:

1. The learner is given a greater center stage in the learning process.
2. Outside of the classroom, students are exposed to new subjects; rather than relying solely on the teacher, they drive their own learning.
3. There are a variety of ways to engage in activities at home. Content is delivered through videos and other online learning resources (collaborative research, digital research, etc.). The teacher or another person may have produced them.

Benefits of Flipped Classroom/ Learning in 21st century

There are various benefits attributed to the flipped classroom approach, including:

1. The flipped classroom approach incorporates all modes of learning, including oral, visual, listening, hands-on, problem solving, etc., according to an empirical study on college reading.
2. The flipped classroom gives students a more application-based learning experience in place of a standard classroom environment (i.e. hands on and problem solving activities).
3. The flipped classroom is incredibly practical, particularly for students who have trouble getting to the actual classroom. These students can still access the course's basic material online.
4. In a flipped classroom, there is a strong emphasis on communication, which mostly refers to interactions between students and teachers.

5. The flipped classroom ensures that the course's primary goal is to contribute to the students' overall success in receiving a proper, effective education by using a student-centered teaching style.
6. Because it encourages students to comprehend the underlying reasoning behind the material being supplied to them, it prevents the general idea of "cramming" for tests and forgetting the information after the examination.
7. Because their individual efforts and contributions will be factored into their final course mark, students must take responsibility for understanding the course material. They will then be more equipped to handle harder classes in the future as a result.
8. Despite the absence of assistance in the pre-class portion, the questions posed by the film could become the basis for discussion topics and other in-class activities. Because of this, students are more attentive throughout class, which means that using video could enhance the impact of in-class activities.
9. Newer applications have shown that students are more committed to completing a task.
10. The ability for students to learn in an environment and at a speed that best meets their requirements allows for individualized instruction and encourages independent study.
11. Critical thinking has never been more important for students learning in the twenty-first century. Students are pushed to think critically through autonomous study, which piques their curiosity and increases their knowledge base.
12. The flipped classroom approach encourages students to work together productively outside of the classroom on social media, while the classroom itself turns into an active center for constructive and fruitful peer-to-peer learning.
13. One ability that every student in the twenty-first century must possess is digital literacy. Students open up a world of possibilities by utilizing technology on a regular basis to view lessons, interact, and contribute.
14. Outside of the classroom, kids are encouraged to be creative and curious thinking leaders by providing them with the means to let their imaginations run wild. It's the age of the innovator, with creativity and innovation emerging as crucial factors for success in the twenty-first century.
15. Students' problem-solving abilities can develop significantly and suitably for the problems that lie ahead. The flipped classroom is the best way to support students in developing 21st century abilities and give them individualized instruction that fits their schedules.

Limitations of Flipped Learning

Flip learning is a revolutionary educational method with lots of benefits. It is an example of an active learning model that is student-centric. Numerous research shows that while it has significant obstacles, teachers and students are generally accepted in it. Let's talk about it below:

A) Unfamiliar Teaching Method Flipped learning is a cutting-edge approach to education. Therefore, many students—even teachers—are unfamiliar with it. Comprehending the flipped learning process is crucial for its effective implementation. There's a chance that pupils won't understand how flipped learning functions or what advantages it offers.

B) Not Participating in Pre-Class Activities Under flipped learning, it is the responsibility of the student to comprehend the concept of the course material as presented by the professors prior to the start of in-class activities. An inadequate quality of the video materials could cause many students to lose interest in the pre-class exercises. If students don't find the video content appealing, they can become indifferent and overlook a crucial idea.

C) The To-Do List for Teachers and Students Students have occasionally grumbled about having too much work assigned to them. There are more tasks required of the students than in a typical

classroom. Teachers also experience a heavy strain because they must provide time-consuming video resources for their students.

D) Time-Eating For students to watch the material outside of class, professors must devote a significant amount of effort to creating video lessons. The teachers must also create learning tasks for the students to complete in class. The first step takes a lot of time, even though these materials can be used in subsequent lectures.

E) Limited Technological Knowledge In a flipped learning environment, familiarity with digital technology is crucial. Both teachers and students must be tech-savvy for a flipped classroom to be successful. Therefore, it could be hindered if someone is not proficient with digital technology.

F) Impractical Aspirations Flipped learning models are designed to include students actively participating in pre-class activities. However, this expectation might not always be deemed reasonable. It is evident that students in a traditional classroom are actively participating in their interactions with teachers. Hence, we cannot presume that students are actively participating in pre-class activities in a flipped learning arrangement.

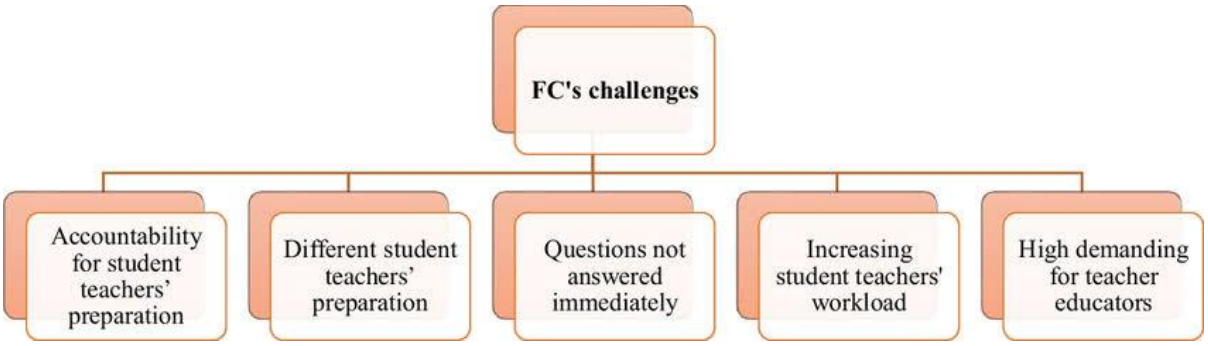

Figure: 3- Flipped Classroom Challenges

The Flipped Classroom Throughout A Student's Journey

The flipped classroom has various benefits at different stages of learning.

a) Early childhood School (0-6 years)

At this point, implementing the flipped classroom is challenging but not impossible. Flipped classrooms can be used to introduce some subjects, such environmental studies and mathematical principles. It's critical that parents understand how to help their kids use new technology at home.

b) Primary Education (6-12 years)

Teachers must inspire pupils at this point because emotional and motivational barriers can prevent learning from occurring both now and in the future. Students that use the flipped classroom model can work in groups, feel more motivated, and get along with their classmates.

c) Secondary Education (12-18 years)

Students will begin interacting with new technologies more deeply at this age. They will be far more driven to work if they can connect them to their education.

d) Higher Education (+18 years)

Because of their maturity, students now make it much easier to implement the flipped classroom concept. It is particularly advantageous for distant learning.

Flipped Classroom Models

Flipped classrooms can be divided into the following subtypes depending on the variation in the distribution of study material, use of classroom time, or type of students –

1. Standard Inverted Classroom

The flipped classroom is a classic. The lecture videos and additional study materials that are required for the upcoming class are given to the students to go through. Typically, a topic's entirety is

transformed into video lectures. During class, students are expected to practice the concepts they have learned at home and engage in various learning activities, such as one-on-one interactions with the teacher, to enhance their knowledge.

2. Micro Flipped Classroom

Short video lectures are given out as study materials in this kind of classroom, along with brief tasks. The remaining portion of the lecture and homework are completed in class.

3. Discussion-Oriented Flipped Classroom

Students are given homework in the form of online videos and recorded lectures. During class time, discussions take place where subjects are further examined. Students who have studied the fundamentals can contribute to the conversation.

4. Demonstration-Based Flipped Classroom

To present content, subjects like math, chemistry, physics, etc., need precise instructions. For instance, accuracy is essential in a topic like geometry. Screen recording software is used in demonstration-based classes to produce educational videos that are given as homework. Students can travel back and forth in the video to completely comprehend concepts instead of having to do it in class, and then return to the classroom to clear any remaining doubts.

5. Faux-Flipped Classroom

This particular model is meant for younger students. The intention is to substitute educational lecture videos and other resources for homework. The teacher gives each student one-on-one supervision and support when they return to the classroom.

6. Group-Based Flipped Classroom

Group learning is the main focus of the group-based methodology. During class time, the students collaborate on assignments after reviewing the assigned material. Retention is increased when students clarify concepts to one another as they learn them.

7. Virtual Flipped Classroom

This technique eliminates tutoring time in the classroom entirely. Similar to university academics, educators share all resources and set aside time during office hours for private consultations. Learning management system platforms are used to gather assignments online.

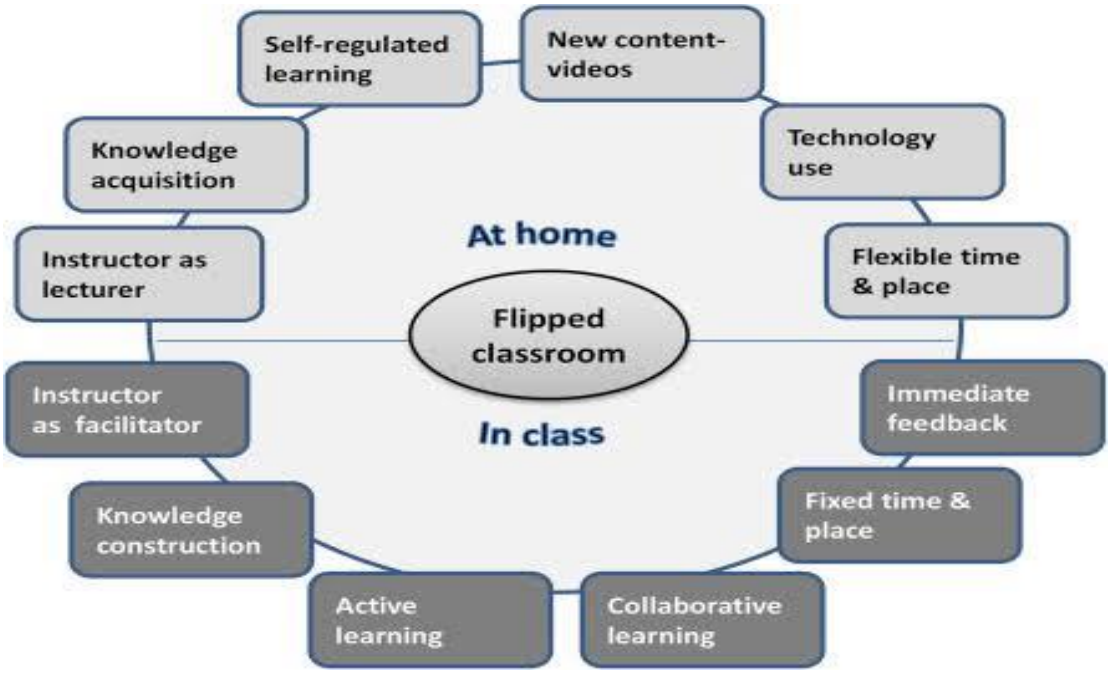

Figure: 4- Flipped Classroom Model at Home and in Class

Conclusion

In summary, the flipped classroom is a cutting-edge method of instruction that moves the focus from the teacher to the student. Involving pupils in the learning process can be greatly enhanced by it. We invite educators everywhere to experiment with it and discover if it works.

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