

## EXPLORING FLIPPED CLASSROOM AS PEDAGOGICAL APPROACH: A SYSTEMATIC REVIEW OF LITERATURE

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The rapid growth in the digitalization and outbreak of COVID pandemic has accelerated the inclusion of technology in education. Higher education in the present world of digitalization faces the challenge of providing high quality education which is cost effective and also caters to the needs of students from diverse backgrounds. Flipped classroom has been positioned as an integrated pedagogical approach which can be implemented in higher education so as to cater to the needs of students of digital world. There is lack of sufficient information regarding implementation designs of flipped classroom. Therefore, present research was conducted to understand the flipped classroom implementation. This paper is a review paper in which a systematic review of implementation designs of flipped classroom has been done. The studies were taken from the year 2010-2023. JSTOR, Springer and Taylor Francis repositories were consulted for the review. A total of 27 review articles were included for conducting the present study. Based on the review the key characteristics of flipped classroom have been determined. The implementation designs of flipped classroom based on systematic review of literature have been discussed. Finally, the best approach for implementing flipped classroom with effectiveness has been assumed.

**Keywords:** Digitalization, Flipped Learning, Higher Education, Implementation Design, Integrated Pedagogical Approach

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## Introduction

The rapid growth in the technological advancements have led educators to include technology in the teaching learning process to provide the suitable learning environment to the learners. This inclusion of digital technologies facilitates the adoption of innovations in the paradigm of teaching and learning and promotes learners' participation and develop their skills. The outbreak of COVID pandemic has accelerated this inclusion of technology in education. However, pandemic revealed various limitations of online learning or learning led by technology which includes lack of ICT training to both teachers and students, less interactivity, lack of attention etc. Blended learning is emerging as a new normal pedagogical intervention which delimits the limitations of both online learning and traditional learning. However blended learning is very vast and includes various modalities and there is no one steady model for its implementation. Therefore now-a-days various researches on developing and implementing various models of blended learning are ongoing. One of such models of blended learning is flipped classroom which reverses the traditional learning in the sense that the learning material is supplied to the learners before in class teaching and then in class meetings are used to learn practical and applied aspects under the guidance of teachers.

There is an increased focus of learning on providing more deeper and meaningful learning to students with the instructional strategy that is student-centric and make them more engaged and active in learning activities. There is need to bring innovation in the teaching learning process by developing innovative methods of teaching (Shikha & Baliya, 2023). In the flipped classroom, traditional teacher-dominated instruction is moved outside of class, making more class time available for active learning opportunities, teacher-student engagement, and group collaboration (Roehl et al., 2013). Flipped classroom is considered as an effective model of learning as it increases the student-centric learning activities and consequently better utilization of classroom time with enhanced learning outcomes (Aidinopoulou & Sampson, 2017). It has great potential in increasing the access to the information and can be developed as a new learning strategy that can be adapted in the new normal situation of pandemic (Diaz et al 2021). Flipped Classroom

Can be utilized in higher education and is known to promote the engagement, achievement, metacognition, attitude and performance of students (Al-Samarraie et al., 2020). Bergmann and Sams(2012) defined flipped classroom as "(1) a means to increase the interaction and personalize contact time between students and teachers and (2) environment where students take responsibility for their own actions. Flipped classroom built better rapport and relationship between students and teachers as teachers gets more time to interact with students and learning can be individualized using flipped classrooms. The peer interaction and collaboration among students also gets improved as students work in groups during in class meetings in the presence of teacher. The student teachers consider flipped classroom as motivating enough to improve their future teaching by using improvised methodologies in the context of pandemic (Ampillo-Ferrer & Miralles-Martínez, 2021).

## Need and Significance

The flipped classroom is gaining popularity as a method of supporting student learning in higher education by requiring students to prepare prior to lectures and actively engaging students during lectures. The previous studies on flipped classroom provide valuable insights into flipped classroom. However, most of the studies do not provide adequate information about effectively practicing flipped classroom in K-12 education. Ogden (2015) emphasizes that the flipped classroom approach needs to be investigated further due to the limited number of studies on flipped classroom and student achievement. Despite the growing body of research in this area, no frameworks for designing and implementing flipped classrooms have been developed (Abeysekera & Daws, 2014). Therefore, it has become imperative to conduct researches for effective implementation and design of flipped classroom. It is critical to consider how new technologies (ICT) enable the emergence of new teaching models that encourage student participation, such as the flipped classroom (FC). Technology plays an important role in transforming the teaching landscape by enabling a student-centric environment in the classrooms (Baliya & Shikha, 2023). Through contextualization in the real world, effective integration of technology with educational processes can facilitate deeper learning (Flores et al., 2016), contributing to

Educational improvement in terms of innovation and quality. The present research is conducted to review articles related to the effective implementation of flipped classroom approach. Based on the review, the key characteristics of flipped classroom have been determined. The implementation designs of flipped classroom based on systematic review of literature have been discussed. Finally, the best approach for implementing flipped classroom with effectiveness has been assumed.

### Research Questions

01. What are the key characteristics of flipped classroom?
02. What are different approaches for implementation of flipped classroom as learning approach?
03. What is the best strategy of implementing flipped classroom as pedagogical approach?

### Methodology

For conducting the present study, a systematic review of studies related to flipped classroom have been carried out. The studies were taken from the year 2010-2023. JSTOR, Springer and Taylor Francis repositories were consulted for the review.

### Methodology Steps

#### Inclusion and Exclusion Criteria

For inclusion and exclusion of articles for the present study, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) technique was applied. PRISMA is a peer-reviewed standard methodology that employs a guideline checklist, which was closely followed for this study, to contribute to the quality assurance of the revision process and assure its replicability. The review was done in following steps:

**Identification:** In the first step the researchers identified the studies related to flipped classroom in JSTOR, Springer and Taylor Francis repositories published during the year 2010-2023. The keywords used for identification of articles included "Flipped Classroom Approach", "Flipped Learning", "Implementation of Flipped Classroom Approach", "Effectiveness of Flipped Classroom", "Flipped Learning Models". A total of 3942 research articles were identified in the initial phase. Out of the identified studies 266 studies have no access and they were excluded from the study.

**Screening:** A total of 3666 research articles were screened for inclusion in the review. Out of these 255 duplicate and similar studies were excluded and 3411 articles were selected through screening.

**Eligibility:** 3411 articles were screened through Title, Keywords and abstract of the studies and 3144 studies were excluded and a total of 267 studies were eligible for the further review of the studies.

**Inclusion:** Out of 267 eligible studies, 240 articles which were not fulfilling the objectives of the present study were excluded and finally 27 studies were included for the review.

Thus, a total of 27 studies were reviewed in the present study. Figure 1 shows the flow-chart describing the criteria of inclusion and exclusion of the articles.

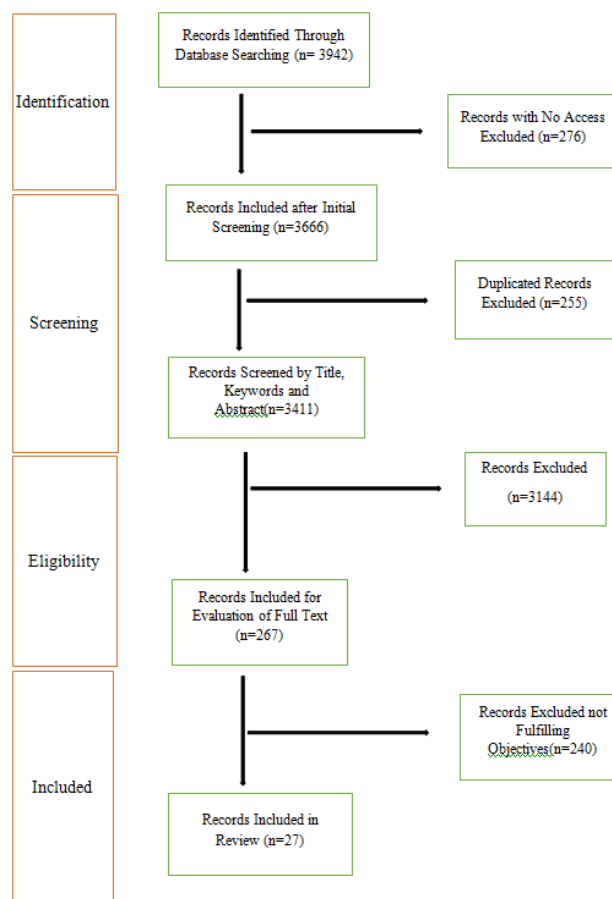


Figure 1. Flow-Chart showing the criteria of inclusion and exclusion of articles through PRISMA Technique

### Review of Related Literature

In the flipped classroom learners are provided a solid base of knowledge

Through multimedia teaching such as videos, pdf, or slides prior to in-class time and then the information is built and delved into the classroom environment. Prior to in-class time, learners are given a solid foundation of knowledge through multimedia teaching such as videos or slides. The information is then built and delved into in the classroom environment. Following review studies have been included in the present study:

Table 1 showing the purpose and major findings of the articles reviewed for the present study.

S.No	Author	Year	Purpose	Major Findings
1.	Shimamoto	2012	To implement flipped classroom through the instructional module	The module was effective but effective implementation of flipped classroom require technical, conceptual and pedagogical skills. Peer and community support is also required.
2.	Moore et al	2014	To propose a flipped classroom model	Two approaches of flipped classroom i.e., Gillet's Approach and Moore's Approach were proposed
3.	Slomanson	2014	To explore blended learning within the context of flipped classroom	New content is provided to students in the form of online videos. Class time is used to provide varied learning experiences.
4.	Hwang et al.	2015	Seamless Flipped Learning Model	Eight strategies for seamless flipped learning were provided.
5.	Graham et al.,	2016	Flipping and still learning	time, space and flexibility is requires to tailor pedagogical approach in flipped classroom
6.	Johnston & Karafotias	2016	Flipping the classroom to meet demands of diverse learners	Flipped learning is an effective and interactive method to meet the needs of diverse learners
7.	Nouri	2016	To study effectiveness of flipped classroom	It is active approach that provides flexibility, adoptability and increases students' engagement
8.	Rotellar & Cain	2016	To provide recommendations regarding implementation of flipped classroom	Linking of in-class activities with out of class activities Not too much burden on students due to numerous activities
9.	Porcaro et al.	2016	Curriculum design for flipped classroom	Four major components : (1) student preparation; (2) weekly pre-class work; (3) in-class active learning strategies; and (4) closing the learning loop with formative quizzes.
10	Hung	2017	Redesigning flipped classroom	Design Based Research involving a number of design principles were proposed
11	Hwang & Lai	2017	To facilitate and bridge in-class activities and out-class activities of flipped classroom	An interactive e-book based flipped learning approach was proposed
12	Jesurasa et al.	2017	To explore factors facilitating engagement in the flipped classroom	Flexibility, feasibility, catering students' expectations, diverse teaching and learning styles, allows delivery of large curriculum
13	Kurt	2017	To implement flipped classroom on preservice teachers	It provides practical knowledge and therefore student-centric and more effective. It is regarded as future of teaching
14	Song & Kapur	2017	Productive Failure Flipped Classroom Model	Students are engaged in exploring problems related to new concepts followed by integration of classroom ideas with the video clips and other additional sources at home on encountering problems
15	Aidinopoulou & Sampson	2018	Implementing flipped classroom in teaching of history	In-class activities, during class activities and after class activities were used as educational intervention for flipped classroom

16	Lee	2018	To explore flipped classroom as model for future learning	The narratives of students and teachers showed overall positive impact of flipped classroom learning
17	Lo	2018	Six Pillars of an Effective Flipped Classroom Approach	Communication, Interaction, Environment, Culture, Instruction and Learning are pillars of flipped classroom approach
18	Turan & Simen	2019	Systematic Review of Flipped Classroom Model	Both students and teachers should have access to digital tools Additional teachers are also required
19	Wang et al	2019	Redesigning Flipped Classroom	There are four stages of flipped classroom which include pre-class stage, interactive stage, post-class stage and evaluation stage.
20	Zheng et al	2020	To examine effectiveness of flipped classroom	Identified 12 variables that moderate the effectiveness of flipped learning
21	Backes et al	2021	To provide pedagogical implications for remote teaching	Digital curriculum should be implemented in addition to flipped classroom
22	Divjak et al	2022	To deliver recommendations regarding use of flipped classroom	Flipped classroom increases interactivity however it has both advantages as well as limitations
23	Cevikbas & Kaiser	2022	To explore potential of flipped learning	It breaks the four walls of classroom and promote students' engagement in learning by technology enabled socialisation and learning.
24	Li et al.	2022	To compare mini-game based flipped learning with video based flipped learning	Mini-game based flipped learning was better than video based flipped learning
25	Sein-Echaluze et al.	2022	To propose a model of flipped learning	Flipped learning 4.0 Model was proposed which integrated two visions: academic vision and organisational learning vision
26	Esperanza et al.	2023	To provide suggestions for successful implementation of flipped classroom	By providing videos to students and then in-depth discussion and end activity evaluation
27	Sointu et al.,	2023	Factors affecting effectiveness of flipped classroom	The first dimension i.e. pedagogical dimension comprises pedagogical content knowledge, teachers' pedagogical perception about teaching, constructive feedback, observed difficulties and guidance.

### Flipped Classroom

Education system all around the globe is transforming at a very rapid rate and this transformation leads to the innovation in terms of teaching learning approach and one of such an innovation is flipped classroom. There is a huge buzz around the definition of flipped classroom however various researchers have provided different definitions of flipped classroom. The concept of flipped classroom emerged in the early 19th century in the United States Military Academy at West Point. The students were provided with learning sources before class and the classroom time was utilized in discussions to solve the problem in a cooperative manner by joint efforts of both the teachers and the students. This is the base of flipped classroom. Lage et al. (2000) considers flipped classroom as an inverted classroom where the traditional learning activities of the classroom are done outside the classroom and vice versa. It has been flipped or inverted in the sense that the activities done in the classroom have been done by students at home through

Asynchronous web content and practical learning activities have been done in the classroom to make it more meaningful and practical. Bishop and Verleger (2013) considered flipped classroom as student centric learning method in which there are two parts with in class lesson having interactive learning activities and out of class lesson with individualized learning activities. Thus, in flipped classroom the teachers provide the teaching content to the students in the form of videos and other digital form and classroom time is utilised in doing other practical and applied aspects of learning. Flipped classroom approach maximises the average time spend for each student than spending all the time for all the students at once. (Hamdan et al, 2013). Flipped Learning Network (2015) considers flipped learning as a pedagogical approach in which the group learning space is converted into individual learning space by providing the content to the students in the form of videos, audios, educational websites and the group learning space is converted into an interactive learning environment by actively involving them in creative learning.

#### Four Pillars of Flipped Classroom

Flipped Learning Network (2014) described that flipped classroom provide learning material to the students before their class and their class time is devoted for practising various learning activities. Four pillars of flipped classroom have been suggested by FLN:

##### 01. Flexible Environment

Flipped classroom is flexible in terms of learning modes, learning activities, learning space, timeline and assessment of learning. The students can learn anytime and anywhere at their own pace and can be actively involved in the learning activities. The teachers are also flexible with the assessment of students' learning.

##### 02. Learning Culture

Flipped classroom engages students in a rich learning culture whereby they have access to the content before class hours and classroom time is devoted with actively involving students in the learning activities which are more of the practical nature and provides experiential learning to students.

##### 03. Intentional Content

Through flipped classroom teachers can analyse the needs of the students and thus can determine

Which content they can handle on their own and on which content they need teachers support and guidance.

##### 04. Professional Educator

Flipped classroom needs professional educators who can adopt various student-centric methods with active learning strategies and can provide continuous feedback and assessment strategies.

#### Key Characteristics of Flipped Classroom as Pedagogical Approach

Flipped classroom has gained significant attention in the recent years. The systematic review of literature provides an insight into various characteristics of flipped classroom. Flipped learning provides more space to the students to provide hands on activities and develop their creativity and inventiveness skills (Prashar, 2015). However, students do not welcome unpredictable or unstructured activities therefore it is suitable for beginners. In the present time of technology there is an indispensable need to integrate online activities with face-face activities. Flipped learning requires access to technological tools to both students and teachers. Sometimes additional teachers can also contribute towards providing effective flipped learning environment (Rotellar & Cain, 2016; Turan & Cimen, 2019). Flipped classroom implementation creates multiple experiences (Graham et al., 2016) for students and teachers. Both offline and online components provide space, time and flexibility by providing diverse learning experiences. Flipped classroom provides real world learning practices to the learners. Flipped learning is an active approach where students can learn at their own pace. The video lectures used in flipped learning provides flexibility, mobility and also increases students' engagement (Nouri, 2016; Jesurasa et al., 2017). The successful implementation of flipped learning provides various skills like technical skills, conceptual skills and pedagogical skills (Shimamoto, 2012). The review also reflects that flipped learning is student-centric as it provides more practical knowledge (Kurt, 2017; Aidinopoulou & Sampson, 2017) and help students in self-pacing. The flipped learning has positive effect on various learning outcomes. Flipped classroom increases personalization of learning through the provision of video lectures, leading to active participation of learners and thereby increase in their academic achievement, self-confidence

And engagement and therefore development of democratic learning environment (Lee, 2018). In addition, it is also known to increase motivation level of students and thereby increasing their academic performance (Karabatak & Polat, 2020). At the same time, it requires pedagogical shift on the part of both student and teachers to gain its maximum benefits which can be done by in-service training of teachers.

Flipped classroom has been influenced by 12 moderating variables (Zheng et al., 2020) like sample levels, sample size, learning domains, flip classroom models, research design, intervention durations, teaching methods in class, sample regions, interactions in a pre-class and face-to-face class, tools in pre-class, and resources in pre-class that should be taken into consideration while designing flipped classroom. Flipped learning enhances the academic performance of students if students are cooperatively involved in knowledge creating with the organisational learning perspective. Flipped classroom 4.0 model was proposed in this regard (Sein-Echaluce et al., 2022) which integrates two visions: academic vision and organisational learning vision. Firstly, students create their knowledge by using their cognitive abilities in cooperative manner. After that the knowledge created is shared with the organisation for its betterment. For satisfaction of students in the flipped classroom ten factors have been reported to influence the effectiveness of flipped classroom (Sointu et al., 2023). These factors are divided into three dimensions. The first dimension i.e., pedagogical dimension comprises pedagogical content knowledge, teachers' pedagogical perception about teaching, constructive feedback, observed difficulties and guidance. Similarly, second dimension include social dimension which include collaborative learning, support from other students, safe atmosphere for learning. Third dimension include technical dimension which includes students' readiness to use ICT and their experience in using ICT. For success of flipped classroom learning its effective implementation is necessary. The teachers can personalise learning of students (Esperanza et al., 2023) by providing videos and through in-depth discussion in the classroom on those videos. However, the video should be short so that students can retain their attention.

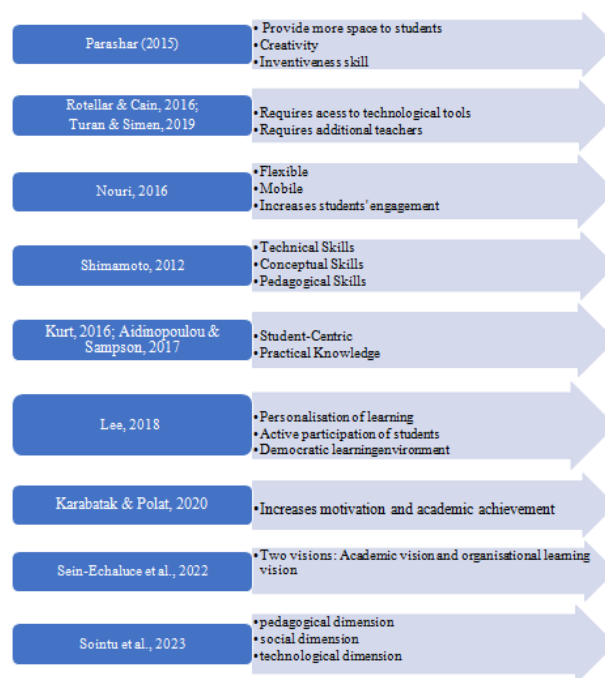


Figure 2 depicting the key characteristics of flipped classroom as reflected by review articles.

#### Approaches for Effective Implementation of Flipped Classroom as Learning Approach

Flipped learning involves providing learning experiences to the students out of class in the form of online videos, online learning material and access to additional learning resources. The class time is utilized to provide varied learning experiences to students in the form of hands-on activities, practical knowledge, creative activities etc. The systematic review enriches our understanding of different approaches for effectively implementing flipped learning in the classroom situation. Two approaches of flipped learning were proposed by Moore et al (2014): Gillet's Approach and Moore's Approach. In Gillet approach video through Weebly, then brainstorming, use of You Tube videos, use of quizzes and availability of offline content were some features.

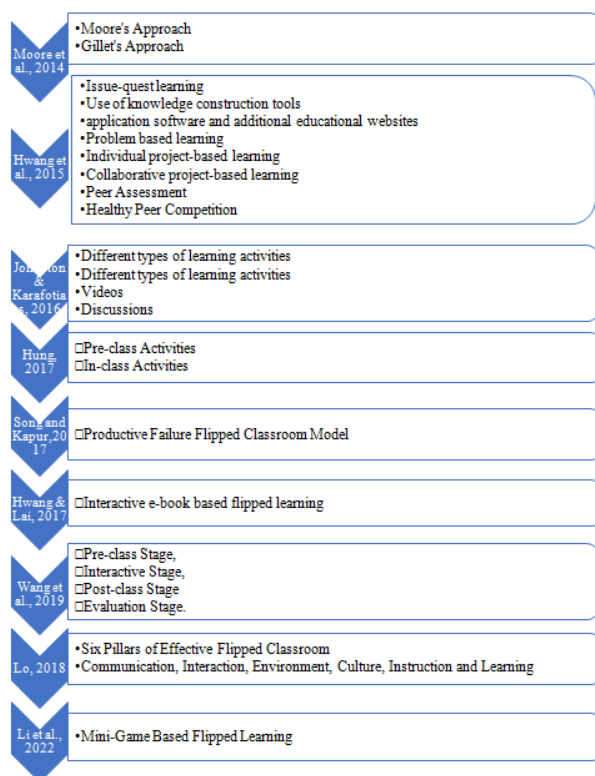


Figure 3 depicting different approaches for effective implementation of flipped classroom

In Moore’s approach Edmodo was used as platform for video lessons. VoiceThread, worksheets for homework, use of web interface were some of the features. Both the approaches were able to enhance students’ engagement in the classroom activities. Eight strategies for seamless flipped learning were anticipated by Hwang et al. (2015). These include:

01. Issue-quest learning which involve raising an issue and then discussion among students by raising questions related to that issue.
02. Use of knowledge construction tools like concept map, spreadsheet, expert system etc. for developing critical thinking skills of students.
  - For supplementing the learning content, application software and additional educational websites should be used.
01. Problem based learning whereby students can explore and use previous knowledge to construct new knowledge.
02. Individual project-based learning which develops skills of problem solving, thinking, planning and decision making.
03. Collaborative project-based learning which develops skills of co-operation, teamwork and also encourages knowledge sharing.

- Peer Assessment should be promoted that can develop the ability of evaluation and higher order thinking. It will also help them to understand the learning effects.
- Healthy peer competition should be prompted by teachers which will instil their motivation and sense of honour.

Flipped classroom is an interactive and effective whereby needs of diverse learners are taken into considerations. However, while designing flipped classroom, learning styles of diverse learners should be taken into account. Different types of learning activities, videos and discussions should be held for creating an effective flipped classroom (Johnston & Karafotias, 2016). However, it should be flexible and feedback from students and observation of classroom by other teachers should also be included so as to incorporate modifications. The curriculum transaction in flipped classroom has been influenced by four major components (Porcaro et al., 2016): (1) student preparation; (2) weekly pre-class work; (3) in-class active learning strategies; and (4) closing the learning loop with formative quizzes. Hung (2017) divided flipped classroom in two phases: pre-class learning phase and in-class learning phase. In the pre-class learning phase students have to watch videos and prepare worksheets of different questions. The in-class learning phase comprises of three steps- firstly students were divided into groups and then worksheets were shared among their groups, secondly group leader discusses these worksheets with others and thirdly reciprocal questioning was done in student led discussion. A productive failure flipped classroom model was provided by Song and Kapur (2017) where by students are engaged in classroom in exploring problems related to new concepts and if they encounter failure while solving them, it is followed by integration of classroom ideas with the video clips and other additional sources at home. Flipped learning provides a multitude of activities to the students in the form of multimedia and other learning resources however, a gap has been created between in-class activities and out of class activities. For effectively implementing flipped learning an interactive e-book based flipped learning approach (Hwang & Lai, 2017) could be used to bridge out the gap between in-class and out of class activities. In this mode students are provided multimedia material in the interactive e-book which can be viewed and

Elucidated by them during out of class activities and then these elucidations are discussed with the fellow classmates and teachers in the in-class activities. In this way students can construct their own knowledge. There are four stages of flipped classroom (Wang et al., 2019). These include pre-class stage, interactive stage, post-class stage and evaluation stage. They put forward four approaches for interactive stage which include students' speed response questions, face-face counselling by teachers, independent practice by students and also team projects in a collaborative manner. These include pre-class stage, interactive stage, post-class stage and evaluation stage. They put forward four approaches for interactive stage which include students' speed response questions, face-face counselling by teachers, independent practice by students and also team projects in a collaborative manner. Lo (2018) proposed six pillars of an effective flipped learning approach which includes Communication, Interaction, Environment, Culture, Instruction and Learning. It was recommended to introduce flipped classroom with parental consent which includes use of multimedia for learning. Creation and utilisation of discussion forums, online quizzes, use of videos with online feedback, optimum utilisation of human and technical resources are some of the recommendations regarding better utilisation of flipped approach. It was further proposed that teacher should provide necessary guidance and support to students so as to complete the challenging tasks of learning. Flipped classroom is an innovative pedagogical intervention which is in use in many schools and universities. Li et al. (2022) proposed a mini-game based flipped learning which involves integration of theories of digital game-based learning with collaborative problem-solving activities so as to improve the process of teaching and learning. This has resulted in autonomous learning by students.

**Best Approach of Implementing Flipped classroom Within the Context of Reshaping Teaching and Learning**

The teaching community has been continuously striving to reshape teaching and learning by implementing variety of teaching learning strategies. The digital era necessitates the utilisation of possibilities of educational technology in this context. Flipped classroom is one such model of blended learning whereby educational technology can be utilised to maximise the learning

Of students. Rigorous research has been going on flipped classroom in the last 15 years. The review of related literature reflects that there are a variety of implementation strategies of flipped classroom so as to enrich the learning experiences of students. Almost all the research studies reflected that the best approach for implementing flipped classroom consists of three phases or stages i.e., pre-class stage, in-class stage and post-class stage. These stages can be further named as preliminary stage, participatory stage and analysis stage.

Pre-class stage or preliminary stage includes activities which students can do at their home at their own pace. These activities include use of online videos, online quizzes, online discussion forum whereby students can watch the videos and solve online quizzes and if encounter any problem can put it in discussion forum.

The in-class stage or participatory phase is the most active phase of flipped classroom whereby both students and teachers actively participated in the learning activities in an interactive learning environment. The students are provided practical experiences whereby teachers arrange variety of activities for them which includes discussions, collaborative learning, project-based learning, game-based learning.

The post-class stage or analysis phase includes analysis of students' difficulties using various formative assessment strategies. For that various digital apps like Kahoot, Google form etc. can be used and then accordingly further plans can be made regarding the preparatory phase and interactive phase.

## Conclusion

Flipped classroom has gained popularity as pedagogical approach from last one decade. Flipped learning individualise learning of students whereby they can control their own pace of learning. The role of teacher has been widened as teacher has to play an active role for organising various activities of flipped classroom. The implementation strategies of flipped classroom have been very wide but all the more almost all researcher points out three main stages of flipped classroom. The proposed approach of flipped classroom can provide significant improvement in the design and practices of flipped classroom. However, further researchers are needed to strengthen the proposed approach.



Future studies could also be done to see the effect of proposed approach on different learning variables of learners.

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