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Virtual Flipped Classroom: An Approach Transforming Online Learning In Indian Higher Education

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ABSTRACT

Calamities come with their challenges but also bring opportunities for transformation. Similarly, COVID-19 has pushed the world to find innovative strategies for coping with the "new normal." An immediate and productive response to this calamity was to go digital. Developing robust online platforms became the need of the hour to offer continuity in the teaching-learning process. Therefore, in this paper, researchers explored how the Virtual Flipped-classroom strategy supported the higher education system during lockdown when all educational institutions were temporarily closed. This experimental study was conducted on 50 students of M.Ed. at "Maharshi Dayanand University, Rohtak" using a true experimental design. The control group was given instructions through virtual one-on-one interaction, and the experimental group was taught using a virtual flipped classroom. Findings indicated a significant difference in the learning outcomes favouring the Virtual Flipped Classroom. The paper's findings aim to facilitate the teaching community to incorporate the Virtual Flipped Classroom Approach by adopting a hybrid model that integrates online learning and face-to-face teaching. It can also motivate teachers to embrace technology to better their teaching methods and grasp how the virtual classroom can provide students with new learning opportunities.

Keywords Virtual Classroom, Virtual Flipped Classroom, Achievement, Indian Higher Education, COVID-19

INTRODUCTION

The world is facing a pandemic due to COVID-19, affecting 213 countries and territories. The pandemic has shaken the whole world. According to the "World Health Organization, Coronavirus Disease (COVID-19) Dashboard" on April 2021, reported that 133,198,847 confirmed cases were found corona positive globally, 2,889,777 deaths were reported, and 107,402,332 were recovered.

Schools and colleges were closed temporarily by most governments worldwide as precautionary measures to break the chain of the corona spread. According to UNESCO, 1,37 billion students have been affected because of the shutdown of academic institutions, and about 60 million university lecturers and school teachers are no longer in the classrooms. This pandemic situation has affected our physical and mental health. Technology has played a vital role in every aspect of life during this lockdown phase, like online shopping, business, education, health consultancy, etc.

Most of us were not ready to accept work from home, but the situation has made us think diversely. The lockdown situation has also disturbed the entire education system. The education system has to shift from the traditional teaching model of chalk-talk to technology-driven teaching. (R. Chaudary, 2020). This drastic shift towards e-learning pushes policymakers and educational institutions to think of solutions to tackle the digital divide. Through virtual lectures and learning management systems, school administration and teachers were advised to continue communicating with students and engaging them in different learning tasks.

"Research and Markets, the world's leading research market store", estimates that the Indian online education market will reach INR 360.3 billion by 2024, up from INR 39 billion in 2018, which is a compound annual growth rate (CAGR) of around 43.85 per cent. The findings of a study conducted by KPMG and Google (May 2017) on web-based education in India revealed that the "online education market size in India in 2016 was USD 247 million, with 1.6 million users." According to forecasts, the market may enlarge to USD 1.96 billion by 2021, with 9.6 million users, demonstrating that "online education is the future of India." The survey reported that the key motivational factors in online education are time flexibility and variety in learning materials. The Indian government launched a "Digital India" campaign to improve online infrastructure to ensure the availability of government services online and empower India's technology and education sector through programs like SWAYAM and E-Basta. Skill India and other programs were also developed to help the country.

Significance of the study

The study aims to find a new teaching model and introduce a unique pedagogical approach by integrating virtual and flipped classrooms. It permits the learners to attend the lectures at home, accomplishes their tasks, and implement their knowledge in a virtual classroom similar to a real classroom. But, our education system has to deal with many problems like network connectivity, lack of technological knowledge in teachers, and the selection of effective online teaching strategies. So there is an urgent need for new pedagogical innovations that can help resolve these issues and problems and face the challenges that may arise in the future like covid-19. With this experiment, researchers have explored which of the two strategies, i.e., Virtual Classroom and Virtual Flipped Classroom is more effective for the teaching-learning process and their benefits and limitations. The researchers have also tried to resolve the problem caused by the limitations of internet connectivity, internet speed, and monotonous online teaching methods.

VIRTUAL CLASSROOM

Virtual education means using the internet to provide education without time and place restrictions. The Virtual Classroom is a synonym for the Online Classroom, which provides "an online learning environment created in virtual space." (Praveen, R., 2012). Students are offered different instructional materials by using multimedia like PowerPoint presentations, audios, videos, documents, etc., in a virtual space that can be accessed from any place with the help of the internet. . Alfieri (2002), characterized virtual education as an effort to supplement the curriculum taught in traditional educational settings with a virtual curriculum that utilizes internet resources to its fullest extent. Students from diverse backgrounds, disabilities, and low- and middle-income areas can benefit from this resource. The changing world and technological advancement in the education system have brought a drastic change in teaching methods and styles.

VIRTUAL FLIPPED CLASSROOM

In online teaching-learning process, teaching becomes monotonous when the teacher introduces the content in class as it becomes a one-way communication. The researcher has explored a new pedagogical approach to overcome such challenges, i.e., the Virtual Flipped Classroom Strategy. The virtual flipped classroom is a new pedagogical approach in which the flipped classroom approach is used in a virtual classroom. A flipped classroom strategy is a blended form of learning in which content is provided to the learners before the class to independently explore the content and attend the class with prior knowledge. Here, physical courses are replaced by virtual classrooms. In this pedagogy, virtual classrooms and flipped classrooms are integrated. Lg, T., & Sle, R. G. (2019) mentioned that a flipped classroom strategy increased the satisfaction and learning of students. Sun, Wu, and Lee (2017) said that a flipped classroom strategy makes students aware of seeking help and promoting self-regulation. Emine Cab revealed that students taught using flipped classroom models were motivated and willing to put effort into learning, but they encountered problems like difficulty in determining the level of content and insufficient resources.

LITERATURE REVIEW

Virtual Classroom

Hind Rasheed Alqirnas (2020) studied students' perception of virtual classrooms as an alternative to actual classes. This paper employs the technology acceptance model as a theoretical framework to explain why students accept or reject virtual classrooms as a substitute for traditional schools. The researchers revealed that perceived utility is a crucial element that favorably influences students' attitudes toward virtual classrooms, particularly among those who want to utilize them in future. Distance learning students' achievements and opinions were examined by Ylmaz (2015) in the context of a live virtual classroom. The study shows a positive reaction among students and mentions two-way communication as a unique advantage of the virtual class. Gedera (2014) surveyed "Students' experience of learning in a virtual classroom" and concluded that it is related to the affordances and limitations of educational technology. Students became active participants by using the discussion and question-answer method. They mentioned a few limitations of the virtual classroom, as technical difficulties like internet stability can sometimes lead to frustration. Garry Falloon (2012) concludes that teachers need to devote more time to design classroom activities and develop multimedia content to encourage more reflective learning. Proper guidelines are needed to be established on using communication tools not to distract others. The virtual learning environment is not a replacement for education in a physical classroom, but it provides a suitable learning environment without physical boundaries. (Praveen, R. & Syed, I. P. 2012).

Virtual Flipped Classroom

In an online flipped classroom, Davy, Ellen, and Samuel (2021) wrote an article that shows how online flipped classroom technique can increase student pleasure and information acquisition. Nighojkar, Plappally, and Soboyejo (2021) investigated the use of animation-enhanced concept-in-context maps in an online flipped materials science course. The preliminary results of the pilot study favored animation-assisted mapping in an online flipped material course.

According to Elkhatat and Muhtase (2020), online education and flipped learning pedagogy can replace traditional laboratories. This approach can be used in conventional computerized laboratories

to mitigate the effects of pandemic COVID-19 confinement on learning outcomes, maximize use of resources, and reach a bigger audience who may not attend traditional lab classes; this practice can be maintained in future.

Hew et al. (2020) used a "cloud-based video conferencing" application to transform two traditional flipped classes into totally online flipped classes. When taking an entirely online flipped course, students are expected to complete all pre-class work prior to class. Students do not meet in person as they would in a regular flipped classroom; instead, they do it virtually. For the second time, this study examined the influence of online flipped classroom on student's education. No difference in performance was found among the students in online flipped classroom and those in traditional flipped classroom. Videoconferencing-enabled online flipped classrooms include seven best practices based on students and teachers feedback. Maarek and Jean-Michel (2020) described the remote learning adaptation of a flipped Biomedical Electronics course, including laboratories. It concludes that using a circuit simulator in virtual electronics laboratories can provide a complete and relevant learning experience.

Using the Virtual Flipped Classroom, a new teaching style, students' motivation was increased, and their computer programming outcomes improved. (Ismail & Abdulla, 2019; Abdulla, 2019)

For her research, Nancy Knapp has been using videoconferencing in a flipped online classroom to increase student interaction (2018). According to data from anonymous end-of-course assessments, a study of 18 online classrooms found that students' responses to these videoconferencing structures were largely positive. From student comments, it was clear that seeing and conversing with big and small groups improved engagement and enjoyment. They also expressed gratitude for the relationships and learning communities that they believed were established due to the contact.

Objectives of the study:

1. To design and develop instructional material for the paper.
2. To study and compare the effectiveness of virtual classrooms and virtual flipped classrooms.
3. To analyze Virtual Flipped Classroom Strategy in India.

Hypothesis for the study:

There exists no significant difference in the effectiveness of the Virtual Classroom and Virtual Flipped Classroom Approach.

METHODOLOGY

Selection of Sample

The sample used in the current research comprised 50 students from the "Department of Education, Maharshi Dayanand University, Rohtak, Haryana". All the students in the study were pursuing their M.Ed.

Research Design

A true-experimental pre-test and post-test design has been followed in this research. Samples were selected randomly, and a post-test was administered to measure the achievement score of both

groups. A few topics of research and statistics from the paper "Advanced Educational Research" for M.Ed. were selected

STEPS FOLLOWED IN CONDUCTION OF RESEARCH:

- Administration of pre-test to measure the achievement scores of both groups before the experiment.
- Students were enrolled in two different chat groups to provide proper instructions and regular updates.
- Conduction of an introductory class to introduce the groups about the experiment of research.
- Conduction of the experiment
- Administration of post-test to study the effectiveness of both approaches.
- Administration of feedback form.

Variables of the study

The nature of the research is experimental, so the variables were classified as independent, dependent and intervening variables.

Independent Variable: The teaching methods in the research were considered independent variables, manipulated into two strategies: Virtual Classroom Approach and Virtual Flipped Classroom Approach.

Dependent Variable: Academic achievement is considered as dependent variable measured after conducting the experimental treatment.

Intervening Variables

Intervening variables are necessary to control as they significantly affect the results of the study. Hence, intervening variables were controlled as follows:

1. Nature of the Department: The samples were selected from a single department i.e. "Department of Education, Maharshi Dayanand University, Rohtak, Haryana".
2. Class level: Class level was controlled by selecting M.Ed. 3rd-semester students for the experiment.
3. Teacher: To ensure uniformity of instruction, the same instructors worked with both groups.
4. Subject: "Advanced Educational Research" was taught to both groups (the experimental and control group).
5. Duration of the instructional Phase: Both groups were taught for three weeks.

Tools used

The researcher developed the non-standardized tool, i.e., an achievement test, to measure the effectiveness of the treatment on the sample studied in the research due to the unavailability of a standardized tool. An achievement test containing multiple choice questions for M.Ed 3rd semester in Advanced Educational Research was constructed to evaluate students' knowledge of the selected topics after the treatment. The tools were developed in two phases: the drafting phase and the final

phase. A feedback form was also constructed to explore their experience in the virtual and virtual flipped classrooms was constructed.

Statistical analysis

The data obtained from conducting the achievement test was analysed with the help of "t" test to test the significance of the difference between the means of the scores of students taught through the Virtual Classroom Approach and Virtual Flipped Classroom Approach.

VIRTUAL FLIPPED CLASSROOM IMPLEMENTATION

The researchers merged virtual classrooms with the flipped classroom strategy. Innovative learning strategies were adopted in our research for both virtual and virtual flipped classroom strategies, like the Brainstorming method and the project method. This new model includes four stages:

Stage 1: Self-understanding: In the first stage of the model, new material like audio, video, PowerPoint presentations, and text documents were provided by the researcher to the learners before the class. At this stage, learners acquired knowledge about the content and tried to understand it.

Stage 2: Collaborative learning with other students: In the second stage of the Virtual Flipped Classroom learners asked questions and collaboratively tried to learn by solving other students' questions and exploring the material more deeply. Learners can interact with each other by using group chat. Educators can reflect, discuss and point out which sub-theme/ part of the lesson needs to be explored deeply in the virtual classroom for better understanding. The educator can also put some open-ended questions to initiate the discussion. This stage promotes collaborative and peer learning and compels them to apply their knowledge and understanding to answer the questions.
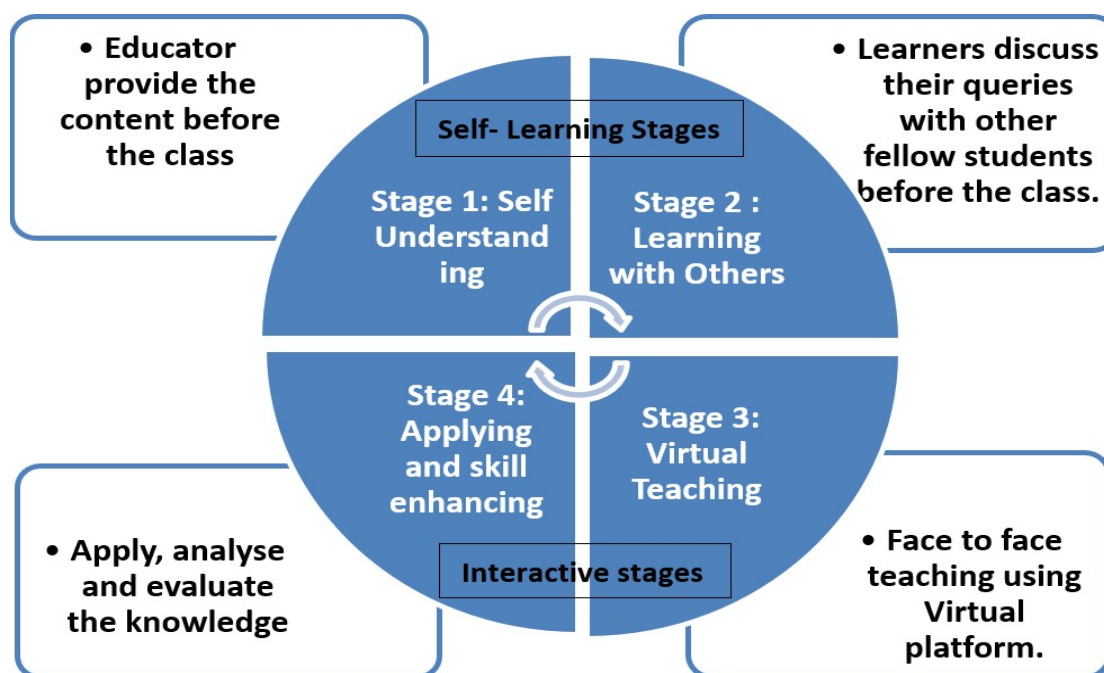

Figure 1: Virtual Flipped Classroom Model

Stage 3: Virtual Classroom: At this stage, face-to-face virtual teaching was done by using a whiteboard, PPT, and chatbox. The present study was initiated with a small brainstorming session. Learners were motivated to raise their queries and explore and reflect on the content. At this stage, learners can apply, analyze, and evaluate their understanding and become capable of creating new or original work

Stage 4: Increasing knowledge and abilities: In this last stage of the model, the educator provides assignments, quizzes, and some small projects to the learners to evaluate, analyze, and apply their knowledge to create new knowledge.

DATA ANALYSIS AND RESULT

Objective 1: To design and develop instructional material for the paper.

The self-developed content using screen recorders and OER (Open Educational Resources) has been used. The video lessons covered the topics: Methods of research, tools and technique of research. All videos were created by using the Screencast-O-Matic programme, which is a free screen and webcam recorder that can be used to capture video directly from a computer's display. We uploaded the videos to YouTube and shared links with the students.

Table1: Self-developed video lectures

| S. No.	Video Lessons	No. of video lectures	Time
1	Descriptive Research	3	30 minutes (10 minutes each)
2	Experimental Research	3	33 minutes (11 minutes each)
3	Case Study	2	20 minutes (10 minutes each)
4	Characteristics of a Good Research Tool	2	18 minutes (9 minutes each)
5	Characteristics and uses of Questionnaire,	2	14 minutes (7 minutes each)
6	Characteristics and uses of Observations	2	20 minutes (10 minutes each)
7	Characteristics and uses of Interview	2	16 minutes (8 minutes each)
8	Writing a Research Paper	2	20 minutes (10 minutes each)
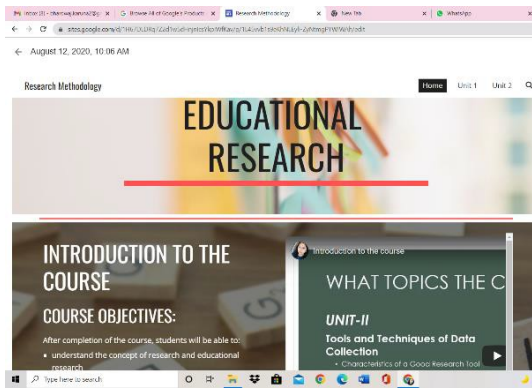
Figure:2: Screenshot of google site developed by researchers
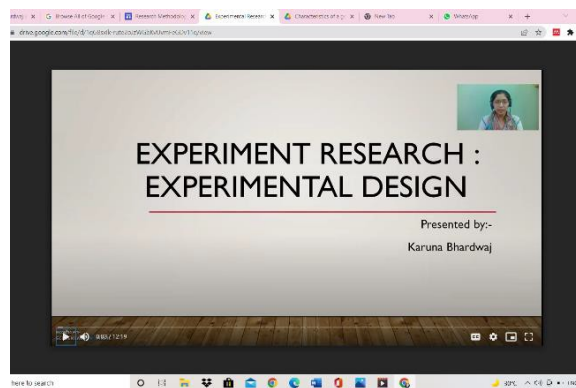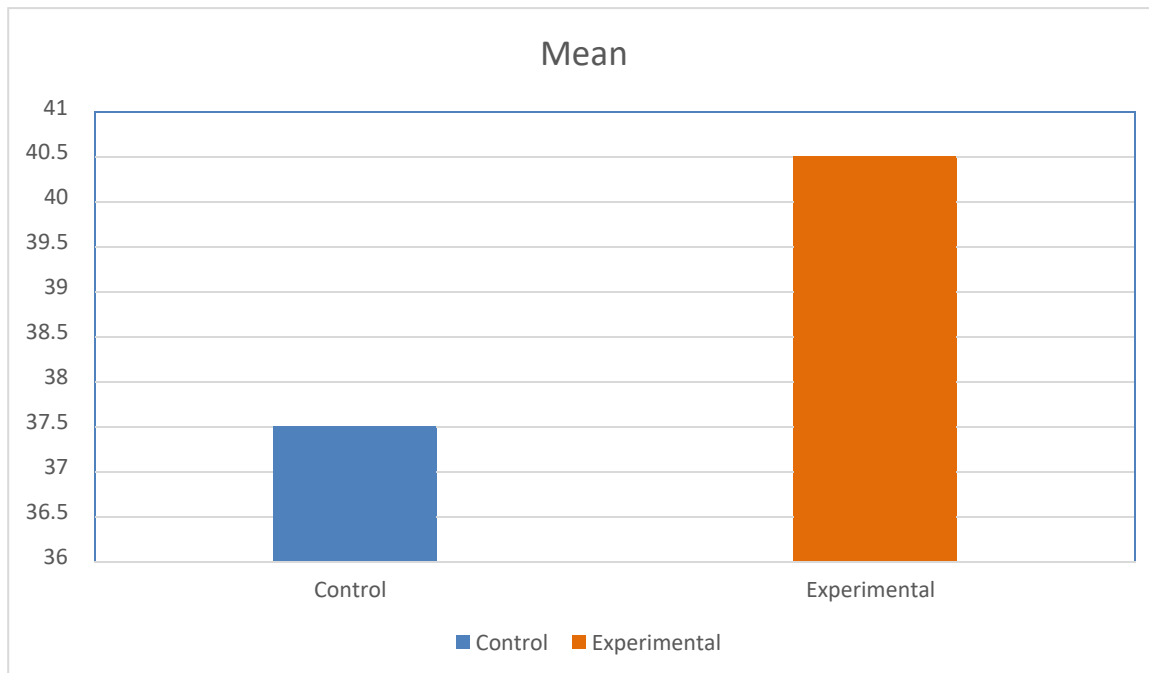

Figure:3: Screenshot of the video developed by the researchers

Objective 2: To study and compare the effectiveness of virtual classrooms and virtual flipped classrooms.

Hypothesis 1: There exists no significant difference in the effectiveness of Virtual Classroom and Virtual Flipped Classroom Approach.

Figure 3: Mean of Control and Experimental group

The table shows the results of the achievement test of students. These results were used to compare the effectiveness of the virtual classroom and the virtual flipped classroom. To achieve this objective of the study, the "t" test was applied to the achievement test scores. The mean score and calculated "t" value have been presented in the table below:

Table 2 Mean and "t" test of the control group and Experimental group

Group	No. of students	Mean	SD	Df	"t" value
CONTROL GROUP	25	37.56			
EXPERIMENTAL GROUP	25	40.56	2.9	48	3.6

*Significant

The mean of the control group's post-test is 37.56, while the mean of the experimental group's post-test is 40.56. The computed t- value is 3.6. At 5% level of significance, the critical value of "t" with 48 degrees of freedom is 2.01. At 5% level, the computed value exceeds the critical value. As a result, the difference is statistically significant at 5% level. The critical value of "t" with 48 degrees of freedom is 2.68 at the 0.01 level, and the computed value is quite large in comparison. As a result, the difference in the means is significant at 1% threshold of significance. As a result, the null hypothesis is rejected at both, 5% and 1% levels of significance, indicating that the difference in means between the two groups cannot be attributed to chance factor or sampling fluctuations. The mean scores of the two groups differed significantly, indicating that the virtual flipped classroom strategy is more effective than the virtual classroom strategy.

Objective 3: To analyze Virtual Flipped Classroom Strategy in India.

Strengths of Virtual Flipped Classroom

On the basis of feedback provided by students, it seems that a virtual flipped classroom helps in connecting students and teachers. It provides a healthy learning environment without any geographical restrictions compared to a virtual classroom. It is also a cost-effective alternative option as compared to physical classes. It is affordable as it saves time and money. Learning materials can be stored in a virtual space that can be accessed anytime and anywhere by using the internet. It creates an opportunity to sharpen digital skills and positively utilize leisure time, which is barely an option for virtual lecture classes. Students can access the content unlimited times and get ample time to understand and remember the content. This approach provides a platform for the learners to develop the pre-requisite knowledge and queries related to the content, which helps them take an active part in the learning process and two-way communication during the virtual face-to-face interaction, as a result, students' learning becomes self-directed. The virtual flipped classroom has been a good option during the lockdown as it provides high interactivity with active participation and engagement of the learners as compared to virtual lectures. It provides an excellent opportunity for collaborative learning and the construction of knowledge collectively, as the teacher can divide the students into small groups and assign tasks to them. Active learning strategies like think-pair-share for promoting learning can also be used in virtual flipped classrooms.

It provides synchronous online learning by providing a very close experience of face-to-face learning as in the physical classroom, and asynchronous learning experiences by providing online video and self-directed activities so that learners can learn at their own pace. It provides a variety of content and learning activities that can be easily updated.

Figure 3

Percentage Comparison of Strength of Virtual and Virtual Flipped Classroom (On the basis of feedback form)
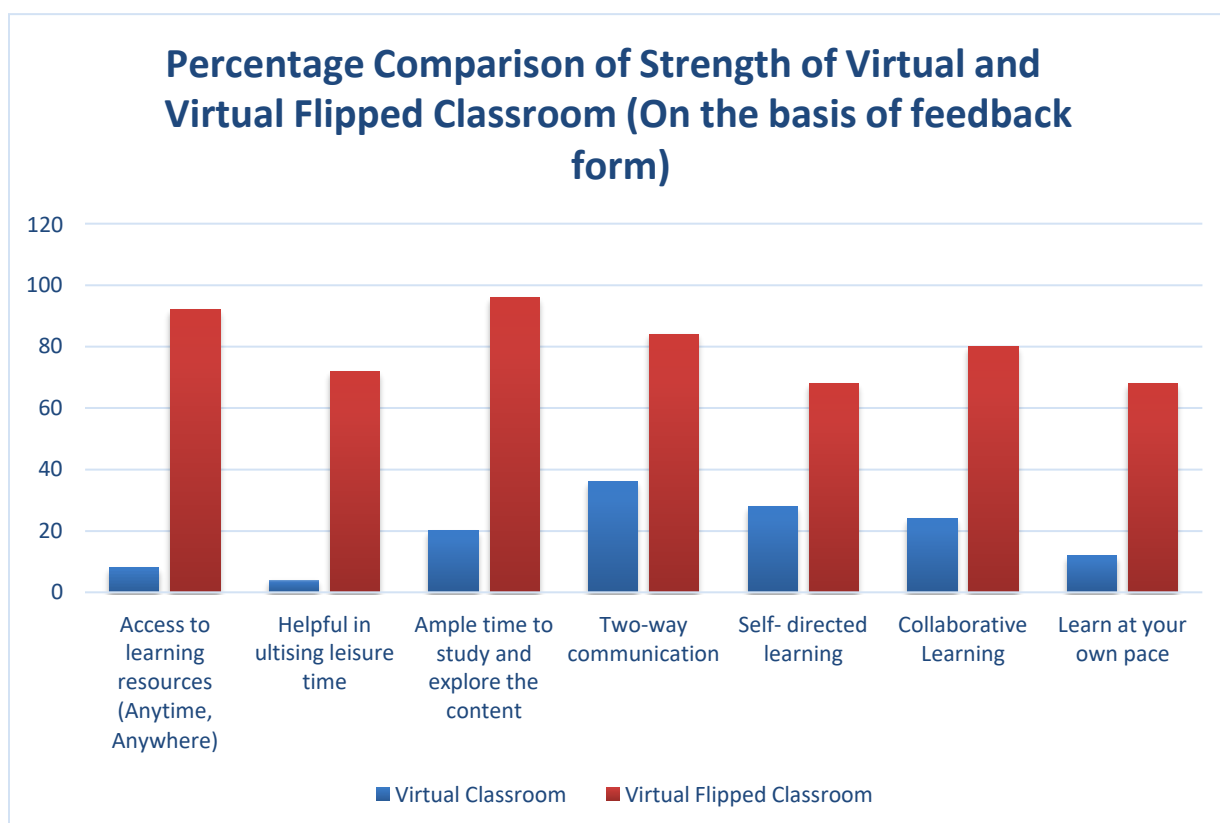
Challenges of Virtual Flipped Classroom in India

According to UNESCO, "Half of the total number of learners, some 826 million (82.6 crores) students were out of the classroom because they did not have access to a household computer and 43 per cent (706 million or 70.6 crores) have no internet at home, at a time when digitally based distance learning was being used to ensure educational continuity in the vast majority of countries due to the Covid-19 pandemic." About 65 per cent of students mentioned that had to access the videos using smartphones as they do not have laptops/tablets. They mentioned it will be easy to study from a big screen The unavailability of a good internet connection seems to be the major hindrance in effectively conducting the virtual flipped classroom. A survey report by Quacquarelli Symonds titled "COVID-19: A wake-up call for telecom service providers" shows that over three per cent of home broadband users face cable cuts, fifty-three per cent face poor connectivity and thirty-two per cent face signal issues. The survey also reveals that about fifty-seven per cent of mobile users face signal issues and forty per cent face poor connectivity.

It requires computers, smartphones, and internet access which might not be available to every student due to one reason or the other. According to the "Telecom Regulatory Authority of India", seventy-eight per cent of the Indian population has a mobile phone, but the phone might not be convenient for lengthy assignments. According to the "National Sample Survey" (2017-2018), only 11% of Indian households have computers.

Electricity is required for the devices to be powered and for the devices to be connected to the internet. According to a nationwide survey (Mission Antyodaya) performed by the "Ministry of Rural Development" in 2017-18, only 47 percent of Indian families received more than 12 hours of electricity every day, 33 percent received 9–12 hours, and 16 percent received about 1–8 hours of electricity. Few students mentioned this as one of the major problems.

To conduct a virtual flipped classroom, an instructor needs to know technology, which seems to be lacking in teachers in India. Lack of proper digital world knowledge and student-teacher preparedness restricted the proper functioning and conduction of the virtual flipped classroom. Many teachers in India have never used online teaching methods. Students mentioned that during conducting the online classes most of the teachers faced some kind of technical problems.

It isn't easy to ensure that each student will explore the content before the class. Skipping this step may influence the effectiveness of the virtual flipped classroom approach. Students may lack in active participation, interaction and in raising queries.

CONCLUSION AND SUGGESTIONS

This pandemic has brought some new challenges as well as opportunities to explore new teaching strategies. Most educators conduct virtual classes using various activities and techniques to make the teaching more interactive and interesting. In the present study, the effectiveness of the Virtual Classroom and Virtual Flipped Classroom Strategy has been compared in India's higher education system. The statistical results of this research indicate that the achievement level of students taught through flipped classroom strategy was higher than the achievement level of the control group taught through virtual classroom strategy. In this research, the researcher has explored the strengths and limitations of the Virtual Flipped Classroom strategy, and it shows that this strategy provides the scope for self-learning and exploration. It provides a flexible and active learning environment and helps deliver more content in less time. The most prominent challenge of the virtual flipped classroom strategy is that it's challenging to ensure that students explore the content before the class, leading to a learning gap. Despite all the limitations, a virtual flipped classroom approach is a powerful strategy for the teaching-learning process. Due to the COVID-19 pandemic, it can be accepted as a suitable replacement for the physical classroom during this period. However, due to low internet connectivity and other limitations, the virtual flipped classroom approach is not proven to be effective and efficient, but it shows how crucial technology plays in the education system. We need to overcome the limitations to benefit from the virtual flipped classroom approach, and institutional support, proper resources, sufficient technical and educational knowledge, and educators' willingness are also required.

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