

**FLIPPED CLASSROOM IN IIT GUWAHATI: STATUS AND PERCEPTIONS OF
TEACHERS**

BY

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Submitted

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CERTIFICATE

This is to certify that **Mr.JUMRI RIBA**, bearing Registration No. MZU/M.Phil./635 of 29/05/2020 student of Master of Philosophy Department of Education, Mizoram University 2019-2021, has completed his Dissertation entitled ***“Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers”*** under my supervision. This is the outcome of his own investigation and the work done by the candidate is the original one and it has not been submitted to any other university or Institution for the award of any degree or diploma and it is within the area of registration. The investigator deserves all the appreciation for his sincere effort.

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DECLARATION

I, Jumri Riba hereby declare that the subject matter of this dissertation is the record of work done by me, that the contents of this dissertation did not form basis of the award of any previous degree to me or, to the best of my knowledge to anybody else; and that the dissertation has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to Mizoram University for the degree of Master of Philosophy in Education.

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CHAPTER – I

INTRODUCTION

1.0 Introduction

Now a day's people learn things more on the Internet rather than newspapers or the books. One can have unpleasant feelings like depression, emptiness, etc., when he/she is not online. Internet provides many facilities like online gaming, shopping, latest information, banking and a platform to interact with people across the globe. In the past two decades, personal computers have played a significant role in our everyday lives, with the growth in popularity and networking of computers, intercommunication between different computers became easier, which led to the phenomenon called Internet. However, internet is a much broader concept than mere entertainment and recreational activities. It is revolutionizing and enhancing the ways of human interaction and communication. So there are many videos available on internet from which one can learn easily. Today most of the people are learning from online videos by browsing to internet in their interest field. The influence of digital videos on our everyday culture is undeniable. Online video sharing sites such as YouTube, Vimeo, and Metacafe boast monthly audience numbers in the millions. With digital videos continuing to gain popularity, it seems only natural that this familiar and widespread platform should extend into the education system. Today Students are using educational videos as a tool for learning everything: from basic skills - like changing a tire - to the latest dance craze. Remarkably, millennials make up 92% of the digital video viewing audience. Abstract topics that once seemed difficult to teach and learn are now more accessible and understandable thanks to the availability of educational videos for online learning. Studies have shown that the use of short video clips allows for more efficient processing and memory recall. The visual and auditory nature of videos appeals to a wide audience and allows each user to process information in a way that's natural to them. The use of videos in teaching and learning serves to not only benefit students, but also teachers, their affiliated institutions, and the entire school system. A 2015 study conducted by software

company Kaltura concluded that 93% of teachers believe that the use of educational videos improves the learning experience. They also serve to break down barriers, such as student and campus location, which were once insurmountable. So, in today's present generation only traditional classroom will not do justice to the students who are already well exposed to ICT technology based learning like YouTube, Khan Academy, Grade up, Unacademy, BYJU'S Learning, e-mail-based information exchange, many other interesting forms of learning and educational entertainment etc. In traditional pattern of teaching teacher gives lecture in class time where most of the activity is done by teachers which mean it is a teacher-centered method, then students are engage to do homework or project in their home but homework is done by their family members. Due to short period of time and many students, teacher is unable to check the homework properly. So, to cope with those problems in students learning approaches, Education system should change the approach of learning system according to the needs and interest of learners which will fulfill the demands of present generation needs. They require scientific techniques that will stimulate them to provoke, explore, discover and learn themselves as much as possible. The teacher should be an effective facilitator. Teachers should provide freedom to innovate to devise appropriate methods of communication and activities relevant to the needs and capabilities of the students. Education system is dynamic in nature so it is constantly changing and adopting new approaches, methods and techniques to meet the needs and demand of the dynamic society for the students. The development of ICT as a learning has raised the education level in all countries and it has changed the way students are being taught at schools and colleges. Due to the popularity of ICT technology the learning habits of students are changing everyday with the new technologies. Our lives are changing more rapidly than ever before. The first 20 years of the 20th century saw more technological advancement than in the entire 19th century. The prediction for the 21st century is even faster. In the 100 years of this century, we'll experience the equivalent of 20,000 years of progress, at today's rate. So, in this 21st Century Education must adapt to match those habits of students with technologies. And it should be used in the classroom as a learning tool. Flipped Classroom is a one of the recent approach which aims to fill those gaps which have been discuss above. In Flipped classroom students watch content at home. The source could be a teacher-created video, the Khan Academy,

or other digital resources. Students then discuss the topic during class time. as a discussion .

Therefore, this study attempted to discover the teacher perceptions of using the flipped classroom rather than more traditional instructional approach in IIT Guwahati of Assam, India.

1.1 Evolution of Flipped Classroom

For many, the flipped classroom approach will seem familiar to teaching methods used for many years: review of the lecture and text material prior to class, with class time spent on developing concepts and collaborative, active learning. Previous models that incorporate similar methods include peer instruction, inverted classroom, and even a method introduced as the classroom flip in the year 2000 by Dr. J. Wesley Baker (Baker, 2000 ; Brame, 2013 ; Crouch, Watkins, Fagen, & Mazur, 2007 ; Lage, Platt, & Treglia, 2000) . The primary difference that enabled the flipped classroom concept to flourish is the utilization of easily accessible digital and online media.

The current approach to the flipped classroom is commonly attributed to two high school teachers in Colorado, Jonathan Bergmann and Aaron Sams (Bergmann et al., 2011; Tucker, 2012). To accommodate students who missed classes, they used basic video recording software that added voice-over and annotation of PowerPoint slideshow presentations accessed through electronic and online media. Bergmann and Sams first called the method the pre-podcasting model: “pre” to address the concept that viewing of the video occurred prior to class and ‘podcasting’ as an acronym for video podcasting. After developing and providing professional development to other teachers, they changed the name to reverse instruction to address the fear teachers expressed with the technology-driven name. A 2010 article appearing in The Telegraph (United Kingdom) attributing Bergmann and Sams’ concepts to Karl Fisch , a high school teacher in Denver who had blogged about the “flipped classroom” model (Pink, 2010). As the term became popular both domestically and abroad, Bergmann and Sams used the flipped classroom name, culminating in the publication of a book in 2012, Flip Your Classroom: Reach Every Student in Every Class Every Day.

In the years since its inception, Bergmann and Sams continue to deliver professional development on the flipped classroom methodology through consultative services, annual conferences, and coordination of a national dialogue through the Flipped Learning Network . The credibility of the flipped classroom methodology has been further expanded by the creation and expansion of additional resources specifically geared toward flipped learning: Khan Academy, Course era, TED-ED, and other massive open online courses providers (Johnson n.d.) . Within higher education, the terminology used for the practice still varies between blended learning, inverted classroom, and flipped learning; but the call for course redesign to model the principles of the flipped classroom continues to be made throughout the literature and through professional organizations (Aronson & Arfstrom, 2013 ; Herreid & Schiller, 2013).

1.2 What is Flipped Classroom?

The “Flip” means moving lectures from the class to pre-class homework, while reserving class time for having students to do the problems and exercises that have traditionally been the domain of out-of-class assignments. Actual “Flipped Classroom” is that new ICT Technologies make it easy to convert instructor lectures through digital recordings and place these online for students’ access outside of face-to-face class time. As a result, students can review lectures in advance of the regular class, then have class sessions for working together on the assignments that traditionally have been done as homework. Not only are students seen as gaining through working together or “homework” problems in class, but instructors are able to more quickly see where students are struggling and provide remedial support.

According to the Flipped Learning Network (2014), “Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter”

The Four Pillars of Flipped Classroom

The flipped classroom techniques emerged with the term called “F-L-I-P” which is considered as pillars of the flipped classroom namely flexible environment, Learning Culture, Intentional Content, Professional Educator (Flipped Learning Network 2014).

Flexible environment

Flipped Learning allows for a variety of learning modes; educators often physically rearrange their learning spaces to accommodate a lesson or unit, to support either group work or independent study. They create flexible spaces in which students choose when and where they learn. Furthermore, educators who flip their classes are flexible in their expectations of student timelines for learning and in their assessments of student learning.

Learning Culture

In the traditional teacher-centered model, the teacher is the primary source of information. By contrast, the Flipped Learning model deliberately shifts instruction to a learner-centered approach, where in-class time is dedicated to exploring topics in greater depth and creating rich learning opportunities. As a result, students are actively involved in knowledge construction as they participate in and evaluate their learning in a manner that is personally meaningful.

Intentional Content

Flipped Learning Educators continually think about how they can use the Flipped Learning model to help students develop conceptual understanding, as well as procedural fluency. They determine what they need to teach and what materials students should explore on their own. Educators use Intentional Content to maximize classroom time in order to adopt methods of student-centered, active learning strategies, depending on grade level and subject matter.

Professional Educator

The role of a Professional Educator is even more important, and often more demanding, in a Flipped Classroom than in a traditional one. During class time, they continually observe their students, providing them with feedback relevant in the moment, and assessing their work. Professional Educators are reflective in their practice, connect with each other to improve their instruction, accept constructive criticism, and tolerate controlled chaos in their classrooms. While Professional Educators take on less visibly prominent roles in a flipped classroom, they remain the essential ingredient that enables Flipped Learning to occur.

How to implement a flipped classroom?

Jeff Dunn (2014) has written a short piece on “The 6-step guide to flipping your classroom”, which presented 6 easy steps for implementing flipped classroom.

1. **Plan:** Figure out which lesson in particular you want to flip. Outline the key learning outcomes and a lesson plan. And check the readymade content available on internet and if it is available then that should be used and then those topic which are not available should be recorded by teacher.
2. **Record:** Instead of teaching this lesson in-person, make a video. A screen cast works. Make sure it contains all the key elements you’d mention in the classroom. In Bergmann and Sams’ book (2012), they also pointed out that do not make a video just for the sake of making a video. Only do so when you feel these are appropriate and necessary. It all depends on the educational goal of your lesson. If making videos better facilitate your instructional goal, and then go ahead.
3. **Share:** Send the video to your students. Make it engaging and clear. Explain that the video’s content will be fully discussed in class. And if anyone does not have the internet connectivity try to share the downloaded or recorded video file with students after the class is over.

4. **Change:** Now that your students have viewed your lesson, they're prepared to actually go more in-depth than ever before.
5. **Group:** An effective way to discuss the topic is to separate into groups where students are given a task to perform. Write a poem, a play, make a video, etc.
6. **Regroup:** Get the class back together to share the individual group's work with everyone. Ask questions, dive deeper than ever before. After the six steps, Review, Revise, and Repeat!

Advantages of Flipped Classroom

1. Flexibility

Limited time is a common obstacle that employees face when taking part in ongoing training, but flipped learning helps by eliminating the need for long, time-intensive in-person lectures. Instead, online courses can fill the role of an instructor as the main source of information. Online courses take much less time than face-to-face learning because they are easier to squeeze between other daily tasks and can be taken from anywhere and at any time. For this reason, it is also the preferred learning style of many employees.

2. Personalized

Flipped learning can help your organization's continuous education program get off the ground by giving your employees the power to spend time where they need it most. In an in-person lecture, employees have to move at the same speed as everyone else and can't pick and choose what to focus on. When you consider that the average employee only has 24 minutes a week to spend on training, it is especially important to maximize that time. Flipped learning allows them to learn on their own, giving them the chance to spend their time on things that they don't understand, and speed by things they are a pro at.

3. Encourages active learning

Flipped learning helps the employee take an active role. In traditional settings, it is the responsibility of the trainer to figure out what knowledge to share and make sure it transfers. As a consequence, it is easy for the employee to become disengaged during a lecture. Flipped learning puts the employees in the driver's seat. It is now up to them to teach themselves what they need to know. Moving learning content from lectures to online courses is not only more convenient, but research also shows that it increases note-taking and decreases distraction.

4. Promotes practical-based learning

Flipped learning uses the contact time with instructors and peers as a chance to apply what they learned in a practical way. Theoretical knowledge refers to facts, theories, and reasoning. But practical knowledge is based on hands-on endeavors and tasks. Flipped learning means they get to use this practice time to work on these practical skills rather than sitting in a lecture. For example, someone would teach themselves the knowledge-based side of football, like its history and the rules of the game on their own. But then, they would spend the time with their coach and team to actually practice the sport! Therefore, flipped learning makes sure that what they learn ends up being applied in their day-to-day work.

5. Reduces costs

Passing on knowledge through in-person training is more costly than through flipped learning. In-person training has the additional costs of hiring an external trainer, travel expenses of the trainer and employees (if they are commuting from different locations), non-worked hours, and a location to host it. Employees do the bulk of the work on their own with flipped learning so all of these costs are greatly reduced

Disadvantages of flipped Classroom

1. Requires greater levels of self-discipline

The learner-focused nature of flipped learning can be a downside for employees who struggle with self-discipline. The employee must be motivated to engage with the learning content and put in the time he or she needs to learn. It is not enough to show up to a lecture and passively absorb what a lecturer shares. More employees might struggle with this than you think! In a survey of 204 employees, 41% indicated that their levels of self-motivation were a barrier to participating in online learning.

2. Reliance on technology

With flipped learning, employees get most of their information from learning content, which is often stored online, rather than an instructor. There are a lot of benefits to hosting the materials online, which you can read more about in our ‘Advantages and disadvantages of online learning’ article. Yet, some people might struggle to use technology. 26% of adults worldwide were found to be computer illiterate in 2016. Other times, employees do not have the appropriate setup for online learning. If they do not have convenient access to electronic devices, working speakers, or a reliable internet connection, it will be difficult for them to participate.

3. Resistance to change

Although flipped learning ultimately saves both the instructor and employees time, setting up your first flipped course will require more time and energy than continuing with the status quo. Instructors have to introduce the employees to an entirely new concept. And the employees will need time to adjust and embrace the move from a passive learning style to an active learning style.

1.3 Rationale of the Study

The aim of this study was to discover teachers' perceptions of using the flipped classroom rather than a more traditional instructional method. It was also attempt to find out the teacher perception of effectiveness, appropriateness for the subject matter and motivation behind using the flipped classroom. And it also study the availability of infrastructure facilities and what are the instructional approaches carried out in this institution. The study was also significant because it will throw light on the functioning and efficiency of the IIT Guwahati Assam. And this study also intends to know the Present Status and implementation of the Flipped classroom. Since 2015 IIT Guwahati was using the Flipped classroom approach, so ICT technology had been developed very fast and many advanced technologies are available in today's 21st century for that, this study was to examine the software availability and technology used in the study area. The study also mostly focus on the teachers since it is a new approach so the teacher is the one who instruct and implement this approach for that this study tends to know the teachers' point of view in the sense advantages and disadvantages of this approach during the implementation of Flipped classroom. The study was very significant because it was the first kind of research being done on the field of education in this institution of IIT Guwahati Assam especially on the issue of Flipped Classroom Approach.

1.4 Statement of the Problem: Flipped classroom is one of the most recent approaches in educational system. As, in flipped classroom teacher need to implement the new approach and they are suppose to make videos of their content topic based on syllabus for the students. And as it is related to ICT technology and media based learning in the classroom. Many teachers get challenges to deal with these technologies due to the development of technological advancement. Since 2015 IIT Guwahati has implemented flipped classroom in their institution. What teachers think about this approach and what is the students achievement with this new approach compare to traditional method. Therefore, the problem being addressed in this study is a gap in the literature related to how teachers perceive the flipped teaching experiences.

“FLIPPED CLASSROOM IN IIT GUWAHATI: STATUS AND PERCEPTIONS OF TEACHERS”

1.5 Operational Definitions of the Key terms

Flipped Classroom: A Flipped classroom is one where students are introduced to content at home and practice working through those concepts at school.

IIT Guwahati : Indian Institute of Technology Guwahati (IIT Guwahati) is a public technical and research university established by the Government of India, located in Guwahati, in the state of Assam in India. It is the sixth Indian Institute of Technology established in India. IIT Guwahati is officially recognized as an Institute of National Importance by the government of India. IIT Guwahati has been ranked 7th both in Engineering and Overall category in NIRF India Rankings 2020, released on 11th June 2020.

Teachers: Teachers in this study indicates the teachers those who are currently teaching in the various department of IIT Guwahati Campus. Teachers are both male and female teachers.

1.6 Research Questions

- 1). what are the infrastructural and instructional facilities available in IIT Guwahati on flipped classroom?
- 2). what are the softwares using by the IIT Guwahati teachers for flipped classroom model?
- 3). what are the perceptions of teachers of IIT Guwahati on Flipped classroom teaching approach?
- 4). what are the perceptions of teachers of IIT Guwahati on advantages and disadvantages of flipped classroom?

1.7 Objectives of the Study

1. To study the infrastructural and instructional facilities on Flipped Classroom available in IIT Guwahati.
2. To find out the softwares use by the teachers of IIT Guwahati in teaching through Flipped Classroom.
3. To study the perceptions of the teachers of IIT Guwahati on Flipped Classroom Teaching Approach.

4. To study the perceptions of teachers of IIT Guwahati on advantages and disadvantages of Flipped classroom.

1.8 Delimitation of the Study

The present study was delimited to IIT Guwahati Teachers only.

CHAPTER-II

REVIEW OF RELATED LITERATURE

2.0 Introduction: Rivew of Related Literature is must for every researcher. Review helps the Researcher to understand the topic and demonstrate own knowledge on the topic. It brings the reader up to date. Review also shows the relationships between different studies. Researcher had study the Review from 2012 to till date.

2.1 Infrastructural and Instructional of Flipped Classroom

Oki (2016) investigated the pedagogical effects of applying the flipped classroom to conduct – Based instruction for English language learner. The research was action research method. The perceptions of student and academic performance were measured by a mixed method. The qualitative results from the post-course questionnaire indicated that students were in favor of flipped classroom. But quantitative data of pre- and post-course questionnaires and academic performance did not reveal statistically significance differences.

Davies, Dean, & Ball (2013) have conducted a study on “Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course”. The purpose of this research was to explore how technology can be used to teach technological skills and to determine what benefit flipping the classroom might have for students taking an introductory-level college course on spreadsheets in terms of student achievement and satisfaction with the class. A pretest posttest quasi-experimental mixed methods design was utilized to determine any differences in student achievement that might be associated with the instructional approach being used. In addition, the scalability of each approach was evaluated along with students’ perceptions of these approaches to determine the affect each intervention might have on a student’s motivation to learn. The simulation-based instruction tested in this study was found to be an extremely scalable solution but less effective than the regular classroom and flipped classroom approaches in terms of student learning. While students did demonstrate

learning gains, the process focus of the simulation's instruction and assessments frustrated students and decreased their motivation to learn. Students' attitudes towards the topic, their willingness to refer the course to others, and the likelihood that they would take another course like this were considerably lower than those of students in the flipped or regular classroom situations. The results of this study support the conclusion that a technology enhanced flipped classroom was both effective and scalable; it better facilitated learning than the simulation based training and students found this approach to be more motivating in that it allowed for greater differentiation of instruction.

Cheng, Ritzhaupt, & Antonenko (2019) done a study on "Effects of the flipped classroom instructional strategy on students' learning outcomes: a meta-analysis". The purpose of this study was to examine the overall effect of the flipped classroom instructional strategy on student learning outcomes in relation to a set of moderating variables including student levels, publication types, study durations, and subject area. This meta-analysis examined studies that compared classrooms that used the flipped classroom instructional strategy and classrooms that did not. Seventeen databases were searched to identify literature meeting the inclusion criteria and resulted in 55 publications with 115 effect size comparisons on cognitive student learning outcomes published between 2000 and 2016. Overall, found a statistically significant effect size ($g = 0.193$; $p < .001$; with a 95% confidence interval of 0.113–0.274) in favor of the flipped classroom instructional strategy. The effect size data were normally distributed and exhibited statistically significant heterogeneity. The effect sizes were significantly moderated by subject area such as mathematics, science, social sciences, engineering, arts and humanities, health, and business. No evidence of publication bias was detected in these data. A full discussion of the findings and implications for educational practice and research were provided.

Hsieha, Wub, & Marek (2017) have investigated on "Using the flipped classroom to enhance EFL learning". To know the benefits of the flipped classroom model for learners of English as a Foreign Language, the researchers used flipped learning and Wen's Output-driven/Input-enabled model to design a holistic oral training course that included

extensive online written and verbal communication for the learning of a wide range of English idioms. The participants were 48 sophomore English majors in two required English oral training classes. A within-subjects research design exposed all participants to learning English idioms by flipped learning, using the LINE Smartphone app, and by conventional instruction. A mixed research method was employed, using multiple sources of data collection, including pre- and post-tests on idioms, two questionnaires (“Perception of Flipped Learning Experience” and “Technology Acceptance Model”), the teachers’ in-class observations, and semi-structured focus-group interviews. The results revealed that the theory-based flipped instruction using online written and oral interaction not only enhanced the participants’ motivation, making them more active in using idioms in class, but also significantly improved their idiomatic knowledge, indicating that the flipped learning was successful in achieving the instructional goals of the class. The authors present insights into the impact of theory-based flipped learning on motivation and idiomatic acquisition; student impressions of the online platform used, LINE; and offer recommendations for practice.

Hwang, Lai, & Wang (2015) have done a research on “Seamless flipped learning: a mobile technology enhanced flipped classroom with effective learning strategies” The flipped classroom has been recognized by educators as an innovative and effective instructional approach. It totally overthrows traditional instruction by switching in-class instruction time with at-home practicing time. While the effectiveness of the flipped room has been identified, the challenges of applying it to school settings have also been pointed out, such as the need for effective in-class learning designs and the necessity of helping students learn across at-home and in school contexts. In this paper, the challenges as well as the definition, characteristics, and educational objectives of flipped learning are introduced; moreover, the seamless flipped learning model is proposed by integrating the features of mobile and wireless communication technologies into the flipped classroom model to provide a guide for researchers and educators to develop effective flipped learning activities and plans for helping students learn seamlessly across contexts.

Pierce & Fox (2012) conducted a study on “Vodcasts and Active-Learning Exercises in a “Flipped Classroom” Model of a Renal Pharmacotherapy Module”. The main objective of the study was to implement a “flipped classroom” model for a renal pharmacotherapy topic module and assess the impact on pharmacy students’ performance and attitudes. Students viewed vodcasts (video podcasts) of lectures prior to the scheduled class and then discussed interactive cases of patients with end-stage renal disease in class. A process-oriented guided inquiry learning (POGIL) activity was developed and implemented that complemented, summarized, and allowed for application of the material contained in the previously viewed lectures. Findings of the study were in improved student performance and favorable student perceptions about the instructional approach. Some of the factors that may have contributed to students’ improved scores included: student mediated contact with the course material prior to classes, benchmark and formative assessments administered during the module, and the interactive class activities.

Flumerfelt & Green (2012) studied on “Using Lean in the Flipped Classroom for At Risk Students”. Schools are working to improve achievement through the examination of instructional practice and the use of instructional technology. This article provides informed commentary on the state of school reform and the need for continuous improvement, instructional improvement and instructional technology improvement. It also presents advocacy for the use of a continuous improvement system called lean as a toolkit for these improvement efforts. A discussion example of an at risk high school’s journey through continuous improvement and the use of a lean tool for analysis for improvement resulting in the innovative use of screen capture technology is shared to highlight one application of the lean framework presented.

Giannakos & Krogstie (2014) have done research on “Reviewing the Flipped Classroom Research: Reflections for Computer Science Education”. Recent technical and infrastructural developments posit flipped classroom approaches ripe for exploration. Flipped classroom approaches have students use technology to access the lecture and other instructional resources outside the classroom in order to engage them in active

learning during in-class time. Scholars and educators have reported a variety of outcomes of a flipped approach to instruction; however, the lack of a summary from these empirical studies prevents stakeholders from having a clear view of the benefits and challenges of this style of instruction. The purpose of this article is to provide a review of the flipped classroom approach in order to summarize the findings, to guide future studies, and to reflect the major achievements in the area of Computer Science (CS) education. 32 peer-reviewed articles were collected from a systematic literature search and analyzed based on a categorization of their main elements. The results of this survey show the direction of flipped classroom research during recent years and summarize the benefits and challenges of adopting a flipped approach in the classroom. Suggestions for future research include: describing in-detail the flipped approach; performing controlled experiments; and triangulating data from diverse sources. These future research efforts will reveal which aspects of a flipped classroom work better and under which circumstances and student groups. The findings will ultimately allow us to form best practices and a unified framework for guiding/assisting educators who want to adopt this teaching style.

Galway, Corbett, Takaro, Tairyan, & Frank (2014) have done a small study on “A novel integration of online and flipped classroom instructional models in public health higher education”. The aim of this paper is to reports on the design, implementation, and evaluation of this novel approach flipped classroom. Using mixed-methods, it examined learning experiences and perceptions of the flipped classroom model and assessed changes in students' self-perceived knowledge after participation in the course. Pre- and post-course surveys were used to measure changes in self-perceived knowledge. The post-course survey also included items regarding learning experiences and perceptions of the flipped classroom model. And also compared standard course review and examination scores for the 2013 NextGenU/Flipped Classroom students to previous years when the course was taught with a lecture-based model. Then conducted a focus group session to gain more in-depth understanding of student learning experiences and perceptions. Students reported an increase in knowledge and survey and focus group data revealed positive learning experiences and perceptions of the flipped classroom model. Mean examination scores for the 2013 NextGenU/ Flipped classroom students were 88.8%

compared to 86.4% for traditional students (2011). On a scale of 1–5 (1 = lowest rank, 5 = highest rank), the mean overall rating for the 2013 NextGenU/Flipped classroom students was 4.7/5 compared to prior years' overall ratings of 3.7 (2012), 4.3 (2011), 4.1 (2010), and 3.9 (2009). Two key themes emerged from the focus group data: 1) factors influencing positive learning experience (e.g., interactions with students and instructor); and 2) changes in attitudes towards environmental and occupation health (e.g., deepened interest in the field). Results show that integration of the flipped classroom model with online NextGenU courses can be an effective innovation in public health higher education: students achieved similar examination scores, but NextGenU/ Flipped classroom students rated their course experience more highly and reported positive learning experiences and an increase in self-perceived knowledge. These results are promising and suggest that this approach warrants further consideration and research.

Shimamoto (2012) carried out a study on “Implementing a Flipped Classroom: An Instructional Module”. Flipped classrooms are shifting the way teachers provide instruction by inverting traditional teaching methods to engage students in the learning process. Using technology, lectures are moved out of the classroom and delivered online as a means to free up class time for interaction and collaboration. In order to effectively implement a flipped classroom, teachers must possess a set of requisite technical skills, conceptual knowledge and pedagogical expertise. Through this study, a web-based instructional module was developed to provide this information to prospective teachers interested in implementing a flipped classroom. Results indicated that the module was effective in delivering an overview of the required material, but could have benefitted from the inclusion of added examples of working implementations to raise the confidence level of the participants. Added support through a learning community, either in-person or online, would help to provide guidance through initiation and expand on the shared experiences of the individuals.

Lai & Hwang (2016) have conducted a study on “A Self-Regulated Flipped Classroom Approach to Improving Students”. Learning Performance in a Mathematics Course the flipped classroom is a well-recognized learning mode that enables effective practice and interactions among teachers and students in the class by switching the in-class instructional time and out-of-class practicing time. However, owing to their lack of self-regulated competence, most students might fail to browse and comprehend the instructional materials out of class by themselves. In this paper, a self-regulated flipped classroom approach is proposed to help students schedule their out-of-class time to effectively read and comprehend the learning content before class, such that they are capable of interacting with their peers and teachers in class for in-depth discussions. In order to evaluate the effectiveness of the proposed approach, a quasi-experimental design was employed in an elementary school Mathematics course. The experimental group students learned with the self-regulated flipped classroom approach, while the control group students learned with the conventional flipped classroom approach. The study was conducted using a quantitative approach. The instruments used were a performance test, and questionnaires of self-efficacy and self-regulation. The experimental results indicated that the post-test score of the experimental group was significantly higher than that of the control group. It was also found that the higher self-regulation students showed significantly different learning achievements when learning with different approaches, while there was no significant difference between lower self-regulation students with the different learning approaches. Moreover, the experimental group showed significantly higher self-efficacy than the control group. In addition, the learning log analysis results further showed that, conforming to the objective of the self-regulated strategy, the students would determine the goals for the next learning phase based on their current performance. To sum up, the findings of this study indicate that integrating the self-regulated strategy into flipped learning can improve students’ self-efficacy as well as their strategies of planning and using study time, and hence they can learn effectively and have better learning achievements.

Moran & Milsom (2014) have investigated study on the “Flipped Classroom in Counselor Education”. Although the concept of the flipped classroom has been around for years and in various formats, it is most often attributed to Bergmann and Sams (2012), who flipped their high school science classes starting in 2006. Since then, the number of flipped classrooms has increased (Educause, 2012). The flipped classroom can be considered “an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computerbased individual instruction outside the classroom” (Bishop & Verleger, 2013, p. 4). Students spend time before class not only reading the material but also engaging with it, allowing them to become more actively involved in their own learning both before and during class (Herreid & Schiller, 2013). Empirical research on the flipped classroom in higher education is limited and has mainly been conducted with undergraduate students and in science fields, but the existing research shows relatively positive results (Bishop & Verleger, 2013). For example, higher performance on exams was associated with flipped classrooms (Day & Foley, 2006; Mason, Shuman, & Cook, 2013), as was increased performance on homework and projects (Day & Foley, 2006). In addition, Enfield (2013) reported that students participating in a flipped classroom indicated that class was engaging and they felt more confident in their ability to learn independently. Tune, Sturek, and Basile (2013) studied graduate students enrolled in flipped physiology courses and reported that the pre-class activities allowed students to generate more thoughtful questions for class discussion. They also found that students scored higher on exams than students taking a traditional course. However, publications and research addressing the use of the flipped classroom in the field of counselor education are nonexistent. Therefore, the purpose of this article is to introduce counselor educators to the flipped classroom by discussing the characteristics, advantages, and disadvantages of using a flipped-classroom approach and by providing a case example of how the flipped classroom can be applied in a master’s-level counselor education course.

Lo, Hew, & Chen (2017) study on “Toward a set of design principles for mathematics flipped classrooms: A synthesis of research in mathematics education”. This paper analyzed the journal publications of mathematics flipped classroom studies in K-12 and

higher education contexts. We focused specifically on a set of flipped classroom studies in which pre-class instructional videos were provided prior to face-to-face class meetings. We examined the following four major issues: (a) the types of out-of-class and in-class instructional activities used, (b) the effect of flipped learning on student achievement, (c) the participant perceptions of flipped classroom benefits, and (d) the main challenges of flipped classroom implementations. A meta-analysis of 21 comparison studies showed an overall significant effect in favor of the flipped classroom over the traditional classroom for mathematics education (Hedges' $g = 0.298$, 95% CI [0.16, 0.44]), with no evidence of publication bias. A broader research synthesis of 61 studies revealed that the flipped classroom approach benefited student learning in three main aspects: increasing in-class time for task/practice, integrating new knowledge with existing beliefs, and real-time feedback. The two most frequently reported flipped classroom challenges were students' unfamiliarity with flipped learning and significant start-up effort on the part of instructors. We hence propose a set of design principles to help foster the transition to the flipped classroom and improve the out-of-class and in-class learning designs. This set of design principles can also provide a more focused agenda for future research to examine the effect of the flipped classroom approach on student learning and motivation.

Mattis (2014) carried out a research on “Flipped Classroom versus Traditional Textbook Instruction: Assessing Accuracy and Mental Effort at Different Levels of Mathematical Complexity”. The purpose of this research with directions for future investigations was to examine flipped classroom instruction versus a traditional classroom; specifically, an instructional video versus traditional textbook instruction to assess accuracy and mental effort at three levels of mathematical complexity. College-level nursing students who require mathematical mastery were used as a pilot test group in anticipation that this experience could be translated for larger data sets of variable age groups. Results indicated that accuracy increased and mental effort decreased with flipped instruction. Using Sweller's cognitive load theory and Mayer's cognitive theory of multimedia learning as theoretical frameworks, this study lends insight into designing effective instruction for learning environments that could benefit from a flipped classroom framework.

2.2 Reviews on Perceptions of Teachers on Flipped Classroom

Johnson (2020) has conducted a study on “Effect of the flipped classroom model on a secondary computer applications course: Student and teacher perceptions, questions and students achievement”. The main purpose of this study was to examine the efficacy of traditional and flipped course delivery methods using a mixed-methods switching replications design. To examine the benefits, shortcomings, perceptions, and academic results of the flipped classroom model while using technology as a supporting tool, a traditional high school computer applications course was “flipped” so that direct instruction occurred prior to class time. It was hypothesized that students in the computer applications class would benefit from the flipped method. Even though the results do not support this hypothesis, the study does provide insight into further research on the topic as well as observations in relation to the findings.

Abuhmaid (2020) investigated Jordanian teachers' perception on the impact of flipped learning on students' learning, teachers' role, and challenges facing its implementation. Teachers' perceptions were investigated in respect to their sex, experience, and teaching subjects. Participants in the study were all the (126) teachers who had already implemented flipped learning. All participants filled teachers' perception on flipped learning questionnaire, which consisted of (37) items in three dimensions: flipped learning's impact on students' learning, teacher's role, and challenges to its implementation. The study was conducted during the second semester of the academic year 2018/2019. Means, standard deviations, MANOVA, and Scheffe's test were used to answer the research questions. The results of the study showed teachers' overall positive attitude toward flipped learning model believing that it improves student learning and transforms teachers' role. Additionally, the results showed that female teachers had stronger views that flipped learning improves students' learning, transforms teachers' roles in the classroom, and faces challenges.

Gough, Dejong, Grundmeyer, & Baron (2017) Study on “K-12 Teacher Perceptions regarding the Flipped Classroom Model for Teaching and Learning”. This study examined K-12 teachers’ perceptions regarding the flipped classroom and differences in teachers’ perceptions based on grade level and content area taught. A researcher-developed survey instrument was used to collect data from K-12 teachers that utilize a flipped classroom in South west and South Central Minnesota. Survey participants totaled 44, which included 27 high school teachers, 15 middle school teachers, and 2 teachers that identified as other. It was found that participants perceived that the flipped classroom creates time for varied instructional techniques, including active learning and higher order thinking, along with increased student-to-teacher interaction. The insights from the study inform teachers in the field about benefits and best practices in regard to the flipped classroom instructional model.

Kelly (2012) attempted to discover teacher perceptions of the use of Flipped classroom method. Results of the study reveal that perceptions of the method are more positive among teachers who typically use lecture as a primary mode of information dissemination.

Ogden (2015) surveyed the Flipped Classroom to examine their perceptions of the Flipped Classroom and to assess the role social media, educational technology, mastery learning, and self-pacing played in Flipped Classroom environments. The survey also addressed how the Flipped Classroom could support student learning and what could be done to improve Flipped Classroom implementations. The survey utilized both qualitative and quantitative research measures. The results revealed three major findings: students are doing less homework in a Flipped Classroom than in a traditional lecture-based classroom, students enjoyed learning in a Flipped Classroom environment, and students benefited from watching their lectures in condensed lesson videos. This research has implications for instructional delivery in 21st century classrooms. The findings of this study illustrate that technology can provide a self-paced instructional setting that can effectively support mastery learning for students. Additionally, educators who use the Flipped Classroom can add additional supporting elements like assessment for learning,

problem-based inquiry, strategies for differentiation, and can create, overall, an environment for instruction that is more flexible than traditional classroom settings. Recommendations made by researcher for improving Flipped Classroom implementation included: interactive instructional videos, increased in-class learning activities, and alterations to assessment.

Hunley (2016) carried out a study on “Teacher and Student Perceptions on High School Science Flipped Classrooms: Educational Breakthrough or Media Hype? The purpose of the research was to evaluate teacher and student perceptions of high school flipped science classrooms. A qualitative phenomenological study was conducted to observe 3 high school science teachers from Georgia, North Carolina, and Tennessee selected through purposeful sampling. Analysis of data from an online survey, direct observation, teacher interviews, and student focus groups helped to identify challenges and benefits of this teaching and learning strategy. Study reveals that teachers find the flipped classroom beneficial to build student relationships but requires a significant amount of time to develop. Mixed student reactions revealed benefits of a flipped classroom as a successful learning tool for current and future endeavors for college or career preparation.

Kader (2019) conducted a study on “Teacher perception on the potential of flipped classroom pedagogical practice in enhancing classroom interactions in Singapore primary classrooms”. The main objectives of the study were to explore the potential of a flipped classroom pedagogical practice in one Singapore primary school on how it can contribute to primary level classroom interactions. Qualitative research tools of semi-structured interviews were designed. Data collected primarily included interviews with teachers. Teachers were interviewed individually. A semi structured, in-depth interview of 30 to 45 minutes was conducted and this was the main form of data collection. The teachers’ lesson plans were also collected to understand about the design of their pre-class and in-class activities. The findings indicated the teachers’ perception towards the practice as providing opportunities for classroom interactions, especially when the students engage in group work discussions in class. According to the teachers’ perspective, the flipped classroom Pedagogical practice has the potential to enhance classroom interactions.

Vaezi, Afghari, & Lotfi (2019) has conducted a research on “Flipped Teaching: Iranian Students’ and Teachers’ Perceptions”. A mixed-method research approach was employed. For the study 80 male and female Iranian advanced EFL learners majoring in English translation, literature, and English teaching and 204 Iranian EFL instructors were selected. They answered the flipped teaching questionnaires, and then ten percent of the participants (8 students and 20 teachers) volunteered for follow-up qualitative data collection procedures to let the researchers produce more profound responses to the related concepts of the study. Then, the data collected from the questionnaires were coded and analyzed. Also, the qualitative analysis of the research was done using the interview to support the quantitative analysis results of the research. The findings of the quantitative part revealed that a majority of students held positive perceptions about engagement, effectiveness, attitudes, and positive affect through flipped instruction constructs in the flipped teaching class. University instructors also had an inclination towards implementing flipped teaching on the whole for the constructs named language improvement, attitudes about flipped instruction, better education through flipped instruction, and difficulty of implementing flipped instruction. The qualitative investigation confirmed the previously-stated results to a great extent in that the EFL students and instructors generally preferred employing flipped teaching and they had positive perceptions about the role of this approach.

Bakar, Abidin, Ali, Isa, & Suhardiliana(2018) investigated on the “ Teachers’ Perceptions Of The Use Of Flipped Learning Approach In Learning Grammar”. The study was aimed to examine teachers’ perceptions towards the application of flipped learning approach in preparing the students for Get into Grammar (GIGvaganza) program and to identify the problems that hindered the maximum use of flipped learning approach in a classroom. This study employed quantitative data enquiry involving 51 teachers from three districts in Pahang. The findings of this study showed that the approach appeared to play a significant role in motivating the students to learn and apply the grammar knowledge as well as to engage in the activities conducted. The findings implied that flipped learning approach is very much important in assisting the students to be active in English classes, particularly in grammar lessons and should also be applied to other skills.

Hashim & Shaari (2020) has conducted a research on “Malaysian Teachers’ Perception and Challenges towards the Implementation of Flipped Learning Approach”. The aims and objectives of the study was to investigate teachers’ perceptions and challenges towards the implementation of flipped learning approach.. This paper briefly discusses on the history of flipped classroom, teachers’ perception and challenges issues of flipped learning approach to ESL/EFL teachers. For collecting data a structured questionnaire was carried out to find out teachers’ perception and challenges in flipped learning approach to ESL/EFL teachers. Sample of this study consist of 50 respondents which are 9 males and 41 females. The finding show that most teachers agreed that they find teaching through online is useful. According to this study the biggest teachers’ challenge in implementing flipped learning approach as they feel teachers’ feedback is very important in the flipped learning classroom. Meanwhile, there was no significant relationship between teachers’ perception and teachers’ challenges.

Unal & Unal (2017) carried out a study on “Comparison of Student Performance, Student Perception, and Teacher Satisfaction with Traditional versus Flipped Classroom Models”. The purpose of this study was to investigate how using the flipped teaching model affects student performance, perceptions, and teacher satisfaction in comparison to the traditional model. 16 teachers implemented the flipped teaching model in their classrooms and reported the results of the flipped teaching model for the first time. Pretests and posttests were used to measure and compare student performance while student and teacher surveys facilitated data collection on student perception and teacher satisfaction. The results of the study showed that, in most cases, the flipped classroom model demonstrated higher student learning gains, more positive student perception and higher teacher satisfaction compared to the traditional model. This study adds evidence to the current literature that, if the conditions are properly set, the flipped classroom should have the potential to be an extremely effective learning style.

Gomez, Jeong, Rodriguez, &Canada (2016) has research on “Performance and Perception in the Flipped Learning Model: An Initial Approach to Evaluate the Effectiveness of a New Teaching Methodology in a General Science Classroom”. This

research aimed to evaluate the effects of the flipped classroom on the students' performance and perception of this new methodology. This study was conducted in a general science course, sophomore of the Primary Education bachelor degree in the Training Teaching School of the University of Extremadura (Spain) during the course 2014/2015. In order to assess the suitability of the proposed methodology, the class was divided in two groups. For the first group, a traditional methodology was followed, and it was used as control. On the other hand, the "flipped classroom" methodology was used in the second group, where the students were given diverse materials, such as video lessons and reading materials, before the class to be revised at home by them. Online questionnaires were as well provided to assess the progress of the students before the class. Finally, the results were compared in terms of students' achievements and a post-task survey was also conducted to know the students' perceptions. A statistically significant difference was found on all assessments with the flipped class students performing higher on average. Study reveals most students had a favorable perception about the flipped classroom noting the ability to pause, rewind and review lectures, as well as increased individualized learning and increased teacher availability.

Osman, Jamaludin& Mokhtar (2014) has study on "Flipped Classroom and Traditional Classroom: Lecturer and Student Perceptions between Two Learning Cultures, a Case Study at Malaysian Polytechnic". The purpose of this study is to determine the lecturer and students' perception and their achievement between two learning cultures, the traditional classroom and flipped classroom. This study has been conducted between two classes; 61 final diploma accountancy students and a lecturer. Questionnaires and interview was conducted and analyze using independent sample t test. The findings show that there is a significant difference in perception ($t(59) = -3.71, p < .05$), mean students in a traditional classroom significantly different ($M = 4.42, SD = .38$) than in a flipped classroom ($M = 4.07, SD = .37$). The mean also shows, students from both classes had similar perceptions on their learning culture. The percentage of students pass their assessments for the flipped classroom, quiz=26%, test=52%, higher than traditional classroom, quiz=17%, test=50%. It was found that the lecturer had more time to spend on problem solving in the flipped class compared with the traditional class, and although it

suffers from a lack of facilities, the flipped class can still be implemented. Therefore, Malaysian Polytechnic institutions could think more globally by teaching locals to meet students' needs of learning with appropriate learning approaches.

Bishop & Verleger (2013) showed that most of the studies conducted to explore student perceptions. And use single group study designs. Mostly the perceptions of students towards flipped classroom are mixed but overall the results are generally positive. Students tend to prefer in-person lectures to video lectures, but prefer interactive classroom activities over lectures. The anecdotal record of the study suggests that students learning are more improved in the flipped classroom in comparison to traditional classroom. And study also suggested for the objective learning outcomes with controlled experimental and quasi-experimental designs and it recommend the researcher to carefully consider the theoretical framework used to guide the design in the classroom activities.

Ayçiçek, & Yanpar (2018) conducted within the English course for four weeks in the year 2016-17 in a secondary school of Hatay in Turkey. In the study, pretest/post-test quasi-experimental design with control group was conducted. Study used descriptive statistic, Mann Whitney U Test and Wilcoxon Sign Test to analyze the quantitative data. And in the final researcher found that there is a significant difference between the pre and post-test score of the experimental group whereas there is no significant difference between the pre and post test scores of control group. So, research found that teachers can be suggested to use flipped classroom.

Purwanto & Wibowo (2019) analyzed the implementation of flipped classroom. The methodology of the study is descriptive qualitative. The results of analysis of the study show that flipped classroom has a positive impact on student learning activities in achievement, motivation, involvement and interaction. The researcher suggested to research on compatibility of classrooms that are reversed.

Ziegelmeier & Topaz (2015) investigated to better understanding of effective of the flipped classroom method. Researcher used the controlled study at a small liberal arts college. It uses two types of classroom method one as traditional and another as flipped classroom. During collection of data researcher collected data and analyzed related to students' performance and perceptions of the approach and also attitude toward mathematics in general. Finally, researcher found student were more comfortable with flipped classroom. And in comparison, to traditional classroom the flipped classroom performed well and completed the work given. There was little difference in performances between the two sections.

Souza& Rodrigues (2015) investigated on effective of the flipped classroom in an introductory programme course. This experimental study compared the effectiveness of a flipped classroom (experimental group, N=48) with a traditional classroom (control group, N=52) in two areas: 1. programming self-efficacy; and 2. academic performance. The results show that the students in the flipped classroom increased programming self-efficacy and achieved higher grades.

2.3 Reviews on Advantages & Disadvantages of Flipped Classroom:

Akcayir & Akcayir (2018) This study presents a large-scale systematic review of the literature on the flipped classroom, aims of the study were advantages and challenges for both students and instructors, and to note potentially useful areas of future research on the flipped model's in and out-of-class activities. The full range of Social Sciences Citation Indexed journals was surveyed through the Web of Science site, and a total of 71 research articles were selected for the review. The findings reveal that the most frequently reported advantage of the flipped classroom is the improvement of student learning performance. We also found a number of challenges in this model. The majority these are related to out-of-class activities, such as much reported inadequate student preparation prior to class. Several other challenges and the numerous advantages of the flipped classroom are discussed in detail. We then offer suggestions for future research on flipped model activities.

Galway, Corbett, Takaro, Tairyan & Frank (2013) conducted a study on ‘flipped’ Environmental and Occupational Health course. This paper reports on the design, implementation, and evaluation of this novel approach. Mixed-methods were used, and it examined the learning experiences and perceptions of the flipped classroom model and assessed changes in students' self-perceived knowledge after participation in the course. And used pre- and post-course surveys to measure changes in self-perceived knowledge. Standard course were also examined. Study revealed positive learning experiences and perceptions of the flipped classroom model. Mean examination scores for the 2013 NextGenU/ Flipped classroom students were 88.8% compared to 86.4% for traditional students (2011). On a scale of 1–5 (1 = lowest rank, 5 = highest rank), the mean overall rating for the 2013 NextGenU/Flipped classroom students was 4.7/5 compared to prior years’ overall ratings of 3.7 (2012), 4.3 (2011), 4.1 (2010), and 3.9 (2009). Two key themes emerged from the focus group data: 1) factors influencing positive learning experience (e.g., interactions with students and instructor); and 2) changes in attitudes towards environmental and occupation health (e.g., deepened interest in the field). The results show that integration of the flipped classroom model with online NextGenU courses can be an effective innovation in public health higher education. These results are promising and suggest that this approach warrants further consideration and research.

Kurtz Tsimerman, Lavi (2014), The study examines students’ assessments of the use of the flipped classroom approach in an undergraduate course in the Business Department at the College for Academic Studies in Israel. Data were collected by a questionnaire distributed toward the end of the course. The students reported that watching videos between lessons enhanced interest, alleviated boredom, and enriched the learning. To a lesser extent, they reported it increased their involvement in learning, understanding of the learning material, and confidence in their ability to understand it. While acknowledging the convenience of watching course videos between classes, however, the participants clearly preferred to watch them in class. Multivariate analysis revealed that working students were less positive about using the flipped-classroom approach than non-working students, female students were more positive than male ones, and older students were more positive than younger ones. Furthermore, the stronger the senses of having

classmates nearby, the more positive the participants were about the contribution of watching the videos.

Marlowe (2012) in this investigation, the effect of the flipped classroom and associated differentiation was studied to measure the impact on student achievement and student stress levels. For the second semester of their senior year, students watched video lectures outside of class and completed assignments during class time. Students reported lower stress levels in this type of classroom environment compared to other classes. While semester grades showed improvement, exam grades did not show significant improvement. Overall, students displayed positive feelings towards the treatment and enjoyed the associated benefits of being able to choose their own assignments and explore concepts they found interesting more in-depth.

Zou (2020) this research conducted a 1-year project on gamified flipped English as a foreign language classroom among 277 primary students and 8 teachers. Data concerning students' and teachers' perceptions were collected by means of in-class observations, interviews, meeting minutes, researchers' observation logs, and teachers' and students' self-reflections and were analyzed according to the grounded theory and thematic analysis. The results showed that both students and teachers agreed on such advantages of gamified flipped classroom: increased learning motivation and engagement developed learning skills and confidence, and improved learning performance and outcomes. However, teachers considered pre-class self-learning as an essential part of flipped classroom and played an important role in helping students remember and understand the basic knowledge so that more time was available in class for gamified and interactive activities that aimed to assist students' applying, analyzing, and evaluating of the knowledge, yet not all students indicated favorable attitude toward it. Such differences were probably related to the students' understandings of the flipped classroom, English proficiency levels, self-regulated learning skills, and ages.

Herrei & Schiller (2016), conducted a study on "Case Studies and the Flipped Classroom". According to this study Students new to the method may be initially resistant

because it requires that they do work at home rather than be first exposed to the subject matter in school. However, in this survey, teachers said that finding good quality videos is difficult. Faculty are using videos produced by sources such as the Kahn Academy (<http://www.khanacademy.org/>) and Bozeman Science (<http://www.bozemanscience.com/science-videos/>) or are creating their own using software programs like Camtasia, PaperShow, and ShowMe or apps on the iPad like Educreations and Explain Everything. They then post these to YouTube, iTunes U, and Podcasts (Vodcasting) or on course management systems like Blackboard or Moodle. The quality of the teacher-created videos is often marginal, however, and creating them requires a significant amount of time. The flipped classroom is similar to other methods that depend heavily on students preparing outside of class. These and related methodologies share some of the same advantages as the flipped classroom as well as that major challenges identified previously. Like the flipped classroom, all of these methods allow instructors to cover principles, facts, and terms as part of out-of class Student preparation and to use classroom time to deliver the applications where students grapple with real world Problems and see the material in context.

Rotellar, PharmD, Cain, EdD, & MS (2016) Flipped or inverted classrooms have become increasingly popular, and sometimes controversial, within higher education. Many educators have touted the potential benefits of this model and initial research regarding implementation has been primarily positive. The rationale behind the flipped classroom methodology is to increase student engagement with content, increase and improve faculty contact time with students, and enhance learning. This paper presents a summary of primary literature regarding flipped classrooms, discusses concerns and unanswered questions from both a student and faculty member perspective, and offers recommendations regarding implementation.

Taylor (2015) it is vital for teachers to keep abreast of new innovations to maintain student expectations and continuously improve performance in the classroom. A major development in recent pedagogical practice has seen the invention, development and implementation of the flipped classroom. Advantages include greater flexibility for students as they can study at their own leisure. In addition, there are opportunities for

teachers to make seminars more interactive and to focus on exploring topics in greater depth after fundamental concepts have been practiced in a flipped class. This scenario has also led to greater student engagement and motivation and reduced tardiness and attendance issues. However, there are several disadvantages regarding its use. The most prominent criticism is that it is not possible to ascertain if a student has actually completed a flipped class until they attend a seminar. The whole flipped model is also wholly reliant on students having the motivation to do work in their own time. The creation, development and implementation of flipped classes can also be labour-intensive and onerous for teachers with already busy schedules. Further criticisms include the lack of instructor contact and necessity for developers to possess requisite technological skills. This study uncovered both positives and negatives regarding its efficacy with a number of students doubting its value in enhancing academic standards. Overall student performance and satisfaction levels were also lower when compared to the previous term when the same module was not flipped.

Ansori & Nafi (2018) although the flipped classroom has attracted much attention, the flipped classroom research in the English teaching context has not been widely explored. This research is intended (1) to explore the general responses of English teachers toward the flipped classroom methodology and (2) to investigate the perceived benefits and challenges of its implementation in English teaching. The total of 10 English teachers from different institutions that applied flipped classroom participated in this research. The data were collected by using questionnaire and interviews. The data were analyzed by using quantitative descriptive and qualitative data analysis. The results reveal that English teachers have positive responses to the flipped classroom methodology. Some perceived benefits of its implementation are facilitating active learning, developing collaborative teamwork, stimulating autonomous learning, and increasing classroom interaction. Meanwhile, the perceived challenges of its implementation deal with supporting facilities, technical and technological problems, and the challenge of creating flipped learning material.

Du Fu & Wang(2014) The flipped classroom has become increasingly prevalent in higher education, and more traditional courses will likely employ the element of the flipped classroom to supplement out-of-class work with video presentations. In particular, the rapid development of mobile devices will put rich educational resources into the hands of students at any time and place. Some new tools may emerge to support the curriculum of the flipped classroom. In face of this situation, there are obviously benefits and challenges co-existence in the flipped model. The paper gives an evaluation of the flipped classroom and provides some recommendations for colleges and universities to ensure that they can take a hard look at class spaces and support the cooperative and collaborative work running smoothly. In the traditional classroom, students often try to capture what is being taught at the instant the teacher says it. They cannot stop to reflect upon what is being taught, and they may miss some significant points because they are trying to transcribe the teacher's words. The application of video and other prerecorded media, by contrast, puts courses under the control of students: they can watch, rewind, and fast-forward as necessary. Courses can be viewed more than once, which may help someone that English is not their native language. At the same time, collaborative learning projects can encourage social interaction, teamwork and cultural diversity among students, making it easier for them to help each other mutual learning and for those of different skill levels to support one another. Teachers can devote time to helping students develop synthesis and explore application during class time through: experiential exercises, team projects, problem sets, and activities that previously had been assigned as independent homework. In the typical classroom, students attend regular class lectures and then do their exercise at home. While, the flipped classroom allows students to read the articles and watch videos at home and then work with their peers on the projects during school hours. All those increase teamwork skills, and enhance mutual understanding and trust. The teacher can spend class time working one-on-one with the student who requires extra help. Students in poor areas may not have the ability to possess the computers and the Internet that the flipped classroom requires. Students who have not personal computers or network would be forced to use public computers or network at a library or an internet café. There are some limitations if it is busy. This is problematic. Another downside is students spend all of their "homework time" in front of a computer screen, which adds the student's time

sitting sedentary, which doesn't help students get up and get away from their computers, televisions, and iPods.

Nawi, Jawawi, Matzin, Jaidin, Shahrill & Mundia (2015) this study examined the use of flipped classroom in geography lessons in one of the pre-university colleges in Brunei Darussalam. The benefits and challenges of using the flipped classroom as a pedagogical tool in geography were also investigated. Data were collected through action research adopting the use of a flipped classroom approach. This meant that learning geography as subject content was done outside the classroom. The findings of this study revealed that it was not necessary to apply flipped classroom for every lessons. Yet, this study found that flipped classroom was most beneficial when students worked on the application of geographical concepts where they learned to analyze and evaluate given scenarios. A significant improvement in the students' academic achievement was also observed where through the interactive classroom activities, students developed a deeper understanding of the subject concepts. On the other hand, there were challenges in conducting a flipped classroom, for instance, some students had problems in accessing the lessons outside the classroom. This was one of the crucial elements conveyed in order to successfully implement a flipped classroom and to create an active learning environment during the class time. Without learning the concepts before the class time, the students reported the feeling of being lost, and thus could not fully participate in the classroom activities. Furthermore, a significant amount of time was wasted during the class time in teaching the students the concepts since they were supposed to have learned them prior to the lesson itself. Finally, the flipped classroom was also found to be a challenge to implement in a classroom known to have a passive learning environment.

Fedistia, Musdi, & Yerizon (2019) Mathematical reasoning ability need to be trained during mathematics learning process at school. Based on the field observations at school, it was found that students' mathematical reasoning abilities were still low. This was due to the hours limitation during teaching and learning process in the classroom, so learning process only focused on explaining the materials without much discussing the exercises

that required reasoning ability in its accomplishment. The Flipped Classroom – Based Learning Model could be an alternative to overcome this problem, because the students could learn at home by using online and offline videos. Thus, the students could prepare themselves first before discussing the reasoning exercises in the classroom. The purpose of this study is to review the advantages and challenges in applying a learning model based on Flipped Classroom. This research is a development research. The method used is a quantitative method to observe improvement in student learning outcomes and qualitative method to review the advantages and challenges of the Flipped Classroom model. The instruments in this study were final tests of mathematical reasoning abilities, questionnaires, interview guidelines, and observation sheets. Research revealed that the advantages obtained: 1) Increased learning outcomes of students; 2) Time efficiency; 3) Student involvement and satisfaction; 4) Increasing student interaction; 5) Overcoming the problem of students 'self-confidence, while the challenges in this model are 1) Lack of students' preparation; 2) Familiarize the model; 3) Limitations of self-help learning; 4) Need a lot of time and work; 5) Access to technology.

Ozdamli & Asiksoy (2016) conducted a study on “**Flipped classroom approach**” the aim of study is to attract attention to its potential in education field and provide to make it recognize more by educators and researchers. With this aim, in the study what flipped classroom approach is, flipped classroom technology models, its advantages and limitations were explained. There are many advantages of flipped classroom approach. The most important one is it increases the interactive period within the class (Fulton, 2012). By means of lecture videos the teacher uses the time for the interaction between teacher and student rather than for teaching. Accordingly the teacher can spare more time to fulfill the learning and emotional demands of students (Goodwin & Miller, 2013). In flipped classroom approach the students can find opportunity to discuss with their teachers which is not a possible situation in traditional approach (Bergmann & Wadell, 2012).

According to Milman (2012) the most important benefit of flipped classroom approach is to support team working within class. The advantages that Fulton (2012) expressed are; students can access lecture videos whenever and wherever they want and it provides

students to learn at their own speed. The students that are educated with this approach are encouraged to think both within and out of class (Kellinger, 2012). Since it is available to be used with various teaching strategies is the other positive side of the approach (Love, Hodge, Grandgenett & Swift, 2013). Parents can follow the courses of students and provide them to help their children is another advantage of it (Goodwin & Miller, 2013). In addition to all these advantages Herreid and Schiller (2013) reported that flipped classroom approach provides students more time to make inventive researches. Despite all these positive sides, in literature there are negative opinions about the method. Students may be stubborn at the beginning and may come to class without preparation. Also lecture videos should be prepared carefully in a way to prepare students for the course. It is hard to prepare such good quality videos and it takes time (Herreid & Schiller, 2013). Springen (2013) expressed that teaching design models that are going to be applied during approach, are limited. Kordyban and Kinash, (2013) attracted attention to the point as a difficulty that how teachers are certain of that the students do their responsibilities out of class well and Bristol (2014) expressed the difficulties in case the students come to class without preparation. Also the obstacles that prevent the usage of approach are expressed as students are lack of equipments such as smart phones, tablets or computers and having internet problems (Kordyban&Kinash, 2013). The biggest disadvantage for teachers is not preparing or broadcasting lecture videos but preparing within class activities and integrating them to flipped classroom approach. In contrast to what is known, this method increases the duty of teachers instead of relieving (Lafee, 2013).

Enfield (2013), has conducted a study on “Looking at the Impact of the Flipped Classroom Model of Instruction on Undergraduate Multimedia Students at CSUN”this study provides a detailed case in which one approach of the Flipped Classroom Model of Instruction was applied in two classes at California State University Northridge. Student reports suggest that the approach provided an engaging learning experience was effective in helping students learn the content, and increased self-efficacy in their ability to learn independently. Additionally, challenges and potential solutions to those challenges are discussed. There was a significant decrease in the amount of preparation time required for

each class meeting and in the amount of time spent on remediation. Based on the findings from this study, it appears that students also benefitted from the flipped classroom approach. Most students found instructional videos helpful, engaging, and appropriately challenging. They appreciated the ability to move through the instruction at their own pace and found note taking, answering questions provided, and working along with videos all effective strategies for learning the content provided in the videos. Additionally, most students found regular quizzes to be a strong motivation to keep up with the instructional videos that were assigned. In this regard, most students believed that the practice of calling on students was both effective for helping them learn the content and necessary in maintaining their engagement during class demonstrations. Lastly, most students reported that they were more confident in their ability to learn a new technology without taking a formal course, and more likely to use instructional videos, than they were prior to taking this course. The improvements in self-efficacy in regards to independent learning indicate that the flipped classroom model may be appropriate for preparing students for 21st century career that will require continued on the job learning.

Turan & Cimen (2020) conducted a study on “Flipped classroom in English language teaching: a systematic review “The aim of this study was to examine the trends and main findings of the studies concerning the flipped classroom method in the field of English language teaching (ELT). For this purpose, databases including Web of Science, Eric, Taylor & Francis and the Educational full text EBSCO were reviewed, and a total of 43 articles were analyzed. Systematic review was used as the research methodology. The articles were analyzed utilizing a content analysis method. The findings of the study revealed that the flipped classroom method in ELT gained popularity among researchers after 2014, and the number of the studies in the field rapidly increased in the last two years (2016–2017). In addition, the most commonly used research methods in flipped classroom in ELT studies were found to be mixed and quantitative methods. In the examined studies, speaking and writing abilities were the most commonly studied language skills. Further analysis revealed challenges, as well as benefits related to the use of the classroom method in English as a foreign language (EFL) classroom. the findings mostly pointed to the benefits of the flipped classroom method. On the basis of the

review, various suggestions are made for practitioners and future research. Reveals the advantages of flipped classroom method in EFL courses. The most commonly mentioned include enhancing engagement of learners (n/411), enhancing learners' speaking skills (n/47), enhancing peer interactions (n/46), and increasing learning achievement of learners (n/46). Although numerous advantages were attributed to the use of the flipped classroom method in the ELT field, the process might not be as smooth as expected, and reveals the most commonly reported challenges as extra workload for learners (n/47) and technology/Internet related problems (n/46).

Ramírez, Hinojosa², & Rodríguez (2014) have done a research on “Advantages And Disadvantages Of Flipped Classroom: Stem Students' Perceptions” This study provides detailed insight of the student's perception of the advantages and disadvantages of learning by this model. Although this paper refers to a Flipped classroom model, the study focuses only in one aspect of this modality: the use of videos for flipping the classroom. The investigation was based on the question: What do STEM students perceive about learning with a flipped classroom model? The sample was taken from different engineering courses: Physics and Material Balances, with a total focus group of 150 students. The study was based on a qualitative approach (study case) and the instruments used for data collection were survey, videos, interviews and photographs. The analysis was made by the instructors involved in this study courses (to make the codes and categories by observation) and also the Qualitative Data Analysis & Research Software (ATLAS-Ti) was used for the same purpose. To validate the results, triangulation of the data was carried out, comparing information from the instruments. Some of the most important results show that the main advantages for students (according to their perception) are: flexibility to learn from the videos (77%), better comprehension of the content (73%), advantage because of previous knowledge to class (34%) and motivation for learning (29%). Among the disadvantages mentioned by the students are: technical problems (34%), in reference to internet, software, etc. Other students' negative perceptions were the lack of instant feedback and that they prefer shorter videos.

Ali & Säberg (2016) has done a study on “The Effects of ‘Flipping’ a Classroom with The Focus on Teaching English as a Second Language” this literature review analyses what advantages and disadvantages can be gained by utilizing the flipped classroom method. The Swedish curriculum has been taken into consideration when conducting this review in order to see whether the method is compatible with the aim of the subject of English in the Swedish upper secondary school. Two key principles behind the flipped classroom are ‘active learning’ and ‘student-centered learning’. These key principles have been discussed and contrasted with the terms: ‘passive learning’ and ‘teacher-centered learning’. Acknowledging the fact that it is a challenge to engage students in their own learning as well as have them realize the benefits of doing so, this paper also highlights the advantages of implementing technology tools in the classroom where one can meet the needs of the students of today. The results of this literature review show that there are many advantages when utilizing the flipped classroom method. For example, the flipped classroom creates well-suited environments where discussions can take place, as the in-class activities aim at all students being engaged, applying concepts and sharing ideas. However, the results also show some disadvantages that may come when converting to a flipped classroom. Some of these are that the flipped model takes adjustment time, students need to adapt to the transition to a flipped classroom, and preparing online lessons is time consuming. Furthermore, both students and teachers need to learn how to use the new technology that comes with the flipped classroom model

McCarthy (2016) has carried out a research on “Reflections on a flipped classroom in first year higher Education”. This paper explores the efficacy of a flipped classroom model for teaching first year students three-dimensional (3D) animation, and analyses the advantages and disadvantages when compared to traditional teaching mechanisms. In 2015, within the course *Introduction to CGI* at the University of South Australia, two different tutorial models were utilized: standard in-class tutorials, within which students were led through a task by a tutor; and ‘flipped classroom’ tutorials, where students completed a task prior to the session, and then engaged with their peers and tutor in large and small group discussions in the classroom. 128 first year students participated in the course, including 22 international students. The two tutorial models were evaluated at the

end of the semester in the form of an online survey, which provided participating students with the opportunity to critically reflect on the learning experience; course staff also appraised the two tutorial formats, providing insight into both learning and teaching experiences. The findings of the study are discussed in light of the growing use of student-centered teaching measures in higher education, and outline the affordances and limitations of each model.

Moffett (2015) have study on “Twelve tips for “flipping” the classroom” The flipped classroom is a pedagogical model in which the typical lecture and homework elements of a course are reversed. The following tips outline the steps involved in making a successful transition to a flipped classroom approach. The tips are based on the available literature alongside the author’s experience of using the approach in a medical education setting. Flipping a classroom has a number of potential benefits, for example increased educator–student interaction, but must be planned and implemented carefully to support effective learning.

Rivera (2016) has done a research on “Flipped Classrooms: Advantages and Disadvantages from the Perspective of a Practicing Art Teacher” The following case study investigates the advantages and disadvantages perceived by a practicing art teacher who has used the “flipped classroom” method. Flipping the classroom is the practice of providing online lectures which students can watch from home as a way to replace lecturing in the classroom. Ideally this practice allows more class time to be dedicated to active learning rather than instruction (Bergmann & Sams, 2014). Proponents of the flipped classroom method believe that it provides many benefits including improvements in classroom efficiency and student engagement; others argue that it is difficult to implement and that unequal access to technological resources disadvantages certain populations (Smith, 2016; Tomlinson, 2015). Despite limitations which restricted the participant to a partially flipped classroom the data was interpreted as generally supportive of flipping. This case study suggests that the advantages of flipped classroom practices outweigh potential disadvantages. It also suggests that issues concerning student access to technology can be successfully mitigated through the use of a partially flipped

classroom. In the future a comprehensive study of art teachers who work with different demographics could be conducted to include a wider range of opinions.

Tainter, Wong Deseda Bittner (2016) has carried out a study on The intensive care unit (ICU) as a dynamic and complex learning environment. The wide range in trainee's experience, specialty training, fluctuations in patient acuity and volume, limitations in trainee duty hours and additional responsibilities of the faculty contribute to the challenge in providing a consistent experience with traditional educational strategies. The "flipped classroom" is an educational model with the potential to improve the learning environment. In this paradigm, students gain exposure to new material outside class and then use class time to assimilate the knowledge through problem-solving exercises or discussion. The rationale and pedagogical foundations for the flipped classroom are reviewed, practical considerations are discussed, and an example of successful implementation is provided. An education curriculum was devised and evaluated prospectively for teaching point-of-care echocardiography to residents rotating in the surgical ICU. The results reveals that Pre intervention and post intervention scores of knowledge, confidence, perceived usefulness, and likelihood of use the skills improved for each module. The quality of the experience was rated highly for each of the sessions. Therefore, flipped classroom education curriculum has many advantages. This pilot study was well received, and learners showed improvement in all areas evaluated, across several demographic subgroups and self-identified learning styles.

Halili & Zainuddin (2015) has study a research on "Flipping the Classroom: What We Know and What We Don't" Flipped classroom is an element of blended learning and it is the reverse of the traditional classroom. The students do not listen to the lectures delivered in the classroom but outside the classroom through online video lecture. The teachers record themselves explaining the subject or get videos from free website such as YouTube to share with students to be watched outside the class. The flipped classroom has several advantages; students become more motivated and confident while discussing in the classroom because they have prepared by watching video lectures before coming to class, the classroom activities become more student-centered rather than teacher-centered

because the teachers just act as facilitators. However, some disadvantages are also found in the flipped classroom it is a new model of learning and not all teachers and students are ready to apply it. This paper will briefly explain the use of flipped classroom as a new model of teaching-learning activity.

2.4 Reviews on Software use in Flipped Classroom

Zengin (2016) has investigated on “The Use of the Khan Academy and Mathematics Software with a Flipped Classroom Approach in Mathematics Teaching”. The purpose of this study was to determine the effect of the flipped classroom approach designed by using Khan Academy and free open source software on students’ academic achievement and to examine students’ views about this approach. The research was evaluated in the light of both qualitative and quantitative data. Twenty-eight (28) students studying in the department of mathematics education in a state university in Turkey comprised the study group of the research which was conducted using a mixed methods research design. A double integral achievement test and an open-ended questionnaire about the flipped classroom approach were used as data collection tools. A Wilcoxon signed-rank test was used for the analysis of quantitative data and content analysis was used to analyze the qualitative data. According to the analysis of the research it was found that the flipped classroom approach designed with using both the Khan Academy and mathematics software increased student achievement in double integral. It was also found that this learning approach enhanced students’ understanding and provided visualization in mathematics teaching. Moreover, it was revealed that this approach promoted retention and made understanding much easier.

Ayçiçek, & Yanpar (2018) has conducted within the English course for four weeks in the year 2016-17 in a secondary school of Hatay in Turkey. In the study, pretest/post-test quasi-experimental design with control group was conducted. Study used descriptive statistic, Mann Whitney U Test and Wilcoxon Sign Test to analyze the quantitative data. And in the final researcher found that there is a significant difference between the pre and post-test score of the experimental group whereas there is no significant difference

between the pre and post test scores of control group. So, research found that teachers can be suggested to use flipped classroom.

Bishop & Verleger (2013) showed that most of the studies conducted to explore student perceptions. And use single group study designs. Mostly the perceptions of students towards flipped classroom are mixed but overall the results are generally positive. Students tend to prefer in-person lectures to video lectures, but prefer interactive classroom activities over lectures. The anecdotal record of the study suggests that a student learning is more improved in the flipped classroom in comparison to traditional classroom. And study also suggested for the objective learning outcomes with controlled experimental and quasi-experimental designs and it recommend the researcher to carefully consider the theoretical framework used to guide the design in the classroom activities.

Purwanto & Wibowo (2019) has analyzed the implementation of flipped classroom. The methodology of the study is descriptive qualitative. The results of analysis of the study show that flipped classroom has a positive impact on student learning activities in achievement, motivation, involvement and interaction. The researcher suggested to research on compatibility of classrooms that are reversed.

Ziegelmeier& Topaz (2015) investigated to better understanding of effective of the flipped classroom method. Researcher used the controlled study at a small liberal arts college. It uses two types of classroom method one as traditional and another as flipped classroom. During collection of data researcher collected data and analyzed related to students' performance and perceptions of the approach and also attitude toward mathematics in general. Finally, researcher found student were more comfortable with flipped classroom. And in comparison, to traditional classroom the flipped classroom performed well and completed the work given. There was little difference in performances between the two sections.

Souza& Rodrigues (2015) investigated on effective of the flipped classroom in an introductory programme course. This experimental study compared the effectiveness of a flipped classroom (experimental group, N=48) with a traditional classroom (control group, N=52) in two areas: 1. programming self-efficacy; and 2. academic performance. The results show that the students in the flipped classroom increased programming self-efficacy and achieved higher grades.

The review of related studies reveals that few studies have been conducted on Flipped classroom in different states of India. Most of the studies are done outside the India. It is also evident from the reviews that the aspects covered under these studies were very small and do not give a complete picture of the status of the flipped classroom approach. Based on the reviews no such studies had been done in IIT Guwahati since they are using Flipped classroom Approach from 2015. Therefore, this study is relevant to carried out for those gaps and needs.

CHAPTER-III

METHODOLOGY

3.0 Introduction

The methodology is an important part of research work. The successfulness of research study depends upon the methodology adopted by the researcher, because the study is carried out by specific steps. Research is very systematic process it follows some rules Research is very systematic process of understanding the reality of things, beings, events and phenomenon. Checking, re-checking, creation and generalization of knowledge is possible through research. This chapter provides information for the methodology, research design and selection of methods used in the research. The chapter had research design including sampling, data collection and data analysis. Also, ethical concerns considered in the entire research process are outlined. This chapter provides a description of methodology used in this research.

3.1 Research Method: Out of various methods of educational research for the present study the researcher has employed descriptive survey method of educational research.

3.2 Population: The population of the study includes all the teachers of IIT Guwahati. At present there are 410 faculties in 11 departments are in IIT Guwahati

3.3 Sample of the study: Fifty teachers were selected through simple random sampling procedure as sample of the study.

3.4 Tool and Techniques Used for Data Collection

In the present study the researcher has used self Developed tools to collect information on the Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers.

- 1). A checklist was developed by the researcher to collect the information about the status of Flipped classroom in IIT Guwahati.
- 2). A questionnaire was developed to reveal the perceptions of the teachers on advantages and disadvantages of flipped classroom

The researcher developed a questionnaire based on related literature and previous studies such as (Aljaraideh, Y. 2019; Newman et al., 2016; Afrilyasanti et al., 2016; Nouri, 2016 & Khanova, McLaughlin, Rhoney, Roth & Harris, 2015). The questionnaire was validated by a group of faculty members of department of education, Mizoram University. Their comments were incorporated for preparing the final version of questionnaire. The reliability of questionnaire was checked by distributing the questionnaire to 10 faculty members of IIT Guwahati outside of the sample of study. After two weeks, the questionnaire was distributed again. The Pearson correlation coefficient was (.72), which is highly reliable.

3.5 Procedure of Data Collection: The researcher took the permission from concern HODs of various departments for selection of teachers for the collection of data. Then researcher administered the questionnaire and collects the information from the teachers of various departments of IIT Guwahati. Then Researcher went to the each teacher's room then explains the purpose and procedure of the questionnaire and the questionnaire were supplied to the teachers and they were asked to fill the necessary entries like Name, sex, Qualifications, in the front page of the Questionnaire. The researcher told the teachers that set of questions formulated with the purpose of seeking their opinion with regard to the Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers. Each question is supplied with set of answers and you need to choose from the given choices the ones that apply to you or simply follow the instructions that will be given after each question. Your kind cooperation will be much esteemed. The confidentiality of your responses was guaranteed by the researcher. The research was administered successfully.

3.6 Procedure of Data Analysis

The pattern of analysis followed the requirements outlined in the statement of objectives and various research questions. Descriptive type of work was done to report the results of the Study on Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers. The teachers were mainly selected from the entire 11 department on Random Sampling

techniques. And questionnaire was distributed to 50 teachers then according to their responses the percentage method was employed to analyze the following data.

CHAPTER-IV

RESULT AND INTERPRETATION

4.0 Introduction

The chapter deals with the analysis and interpretation of the data collected. The data was collected from the sample representing the entire population of the study. The analysis and interpretations are based on the responses of the teachers. They are tabulated under each question in terms of frequency and percentage.

4.1 Personal profiles of participants

Table 1 Showing the profiles of Participants IIT Guwahati (N=50)

DETAILS		NUMBER	PERCENTAGE
Gender	Male	30	60%
	Female	20	40%
Age Group	Below 25	0	0
	26-35	21	42%
	36-45	21	42%
	46-55	4	8%
	56-65	4	8%
Educational Qualification	Ph.D	50	100%
Designation	Professor	8	16%
	Associate Professor	11	22%
	Assistant Professor	31	62%

Source: Questionnaire Survey 2021

Table 1. Showing that researcher has collected data from participants were 60% male and 40% Female. And of participants' age falls under the age group of 26-35 and 42% age falls under the age group of 36-45. 8% of were under the age group of 46-55 and 8% more were from 56-65 year age. And 100% of participant's qualifications were Ph.D.

Then 16% of data was collected from Professor and twenty two percent from Associate Professor and then 62% were Assistant Professor.

4.2 Analysis of Infrastructural and Instructional Facilities on Flipped Classroom Available In IIT Guwahati.

Objective1. To study the infrastructural and instructional facilities on Flipped Classroom available in IIT Guwahati.

Table 2. Showing Checklist of Infrastructure availability in IIT Guwahati every department (N=50)

Department Name	Computers	LCD Projectors	White Screen	Recording Room	Studio	Camera	Wi-Fi	Computer Lab
Bioscience and Bioengineering	✓	✓	✓	✓	✓	✓	✓	✓
Chemical Engineering	✓	✓	✓	✓		✓	✓	✓
Chemical Science and Technology	✓	✓	✓	✓		✓	✓	✓
Civil Engineering	✓	✓	✓	✓		✓	✓	✓
Computer Science and Engineering	✓	✓	✓	✓		✓	✓	✓
Design	✓	✓	✓	✓	✓	✓	✓	✓
Electronics and	✓	✓	✓	✓		✓	✓	✓

Electrical Engineering								
Humanities and Social Sciences	✓	✓	✓	✓		✓	✓	✓
Mathematics	✓	✓	✓	✓		✓	✓	✓
Mechanical Engineering	✓	✓	✓	✓		✓	✓	✓
Physics	✓	✓	✓	✓		✓	✓	✓

Source: Questionnaire Survey 2021

From the table 2 it is clear that there are 11 departments in IIT Guwahati. All the departments have the adequate computers, LCD Projectors, White Screen, Camera and computer Lab and they have the common Recording Room for whole campus and Studio is there for Design Department. Wi-Fi Facilities are available in every departments and hostels.

Table 3. Showing in what way are computers shared at their department / classroom (N=50)

Computer are not used		Several people share one computer		One computer per person		Two or more computer per person	
Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
4	8%	6	12%	39	78%	1	2%

Source: Questionnaire Survey 2021

The table above clearly shows that 8% of computers are not used in IIT Guwahati and 12% several people share one computer in their classroom or department. Majority of the people 78% used one computer per person. And only 2% of computers are using two or more computer per person. Thus most of the people used one computer per person in IIT Guwahati.

Figure.1. Showing In what computers are shared in their Department of IIT Guwahati

■ Computer are not used ■ Several people share one computer
■ One computer per person ■ Two or more computer per person

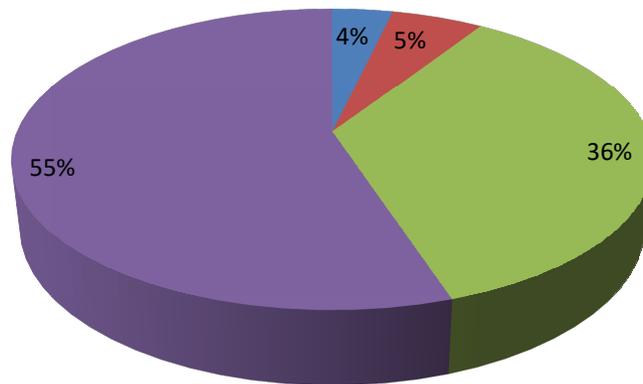


Table 4. Showing how content are introduced before classroom In IIT Guwahati (N=50)

Pdf		Video		Audio		Word	
Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
24	48%	16	32%	5	10%	5	10%

Source: Questionnaire Survey 2021

The table shows that 48% of teacher introduced the content in form Pdf before classroom while teaching flipped classroom approach. And 32% share their content in Video to the students; only around 10% each share in form of audio and Microsoft Word.

Figure 2. Showing how content are introduced before classroom in IIT Guwahati.

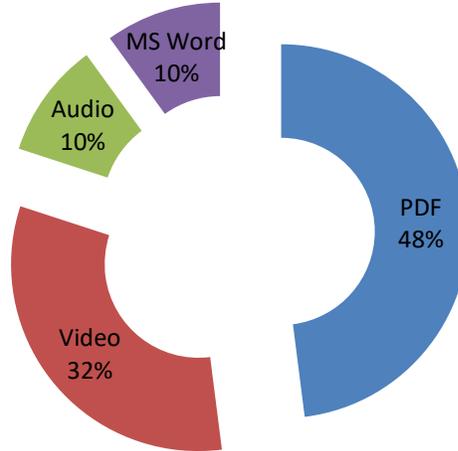


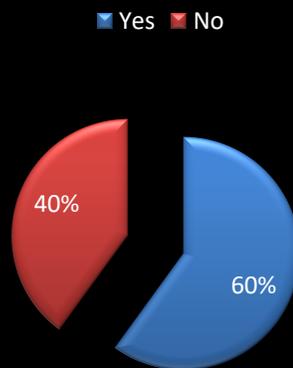
Table 5. Showing teacher using Flipped Classroom (N=50)

Yes		No	
Frequency	Percentage	Frequency	Percentage
30	60%	20	40%

Source: Questionnaire Survey 2021

The above table 5 it is clearly indicating that 60 % of teachers in IIT Guwahati are using flipped classroom approach and around 40% are not using Flipped Classroom Approach. Most of the teacher those who are using Flipped Classroom approach they had been using this approach since 2 years.

Figure 3. Showing the percentage of teacher using Flipped Classroom Approach.



4.3 ANALYSIS OF VIDEO EDITING SOFTWARE USED BY THE TEACHERS OF IIT GUWAHATI IN FLIPPED CLASSROOM

Objective 2. To find out the software's use by the teachers of IIT Guwahati in teaching through Flipped Classroom.

Table 6. Showing the Video Editing Software used by the teachers of IIT Guwahati (N=50)

Sl.No	Name Of Software	Frequency	Percentage
a.	Vimeo create	2	4%
b.	Cyber Link Power Director	2	4%
c.	Adobe premiere elements	2	4%
d.	Final cut pro	3	6%
e.	Corel video studio ultimate	4	8%
f.	Adobe premiere rush	4	8%
g.	Filmora	3	6%
h.	Pinnacle studio	3	6%
i.	Adobe premiere pro	7	14%
j.	Kinemaster	3	6%
k.	DaVinci Resolve	1	2%

l.	Light works	1	2%
m.	VSDC	1	2%
n.	Hitfilm Express	1	2%
o.	Shotcut	2	4%
p.	Camtasia	11	22%
q.	Youtube Editor	1	2%
r.	Openshot Studio	2	4%
s.	Obs Studio	3	6%
t.	Gihost	1	2%
u.	KDENLIVE	2	4%

Source: Questionnaire Survey 2021

Table 6 shows that Majority of teachers Around 22% use Camtasia video editing software and some of teachers 14% use Adobe premiere pro and only 8% use Corel video, studio ultimate, Adobe premiere rush, then 6% use Final cut pro, Filmora, Obs Studio, Kinemaster, only 4% of teachers use Vimeo Create, Cyber Link Power Director, Adobe premiere elements, Shotcut, Openshot Studio, KDENLIVE, very few teacher 2% use DaVinci Resolve Light works, VSDC, Hitfilm Express, Youtube Editor, Gihost,

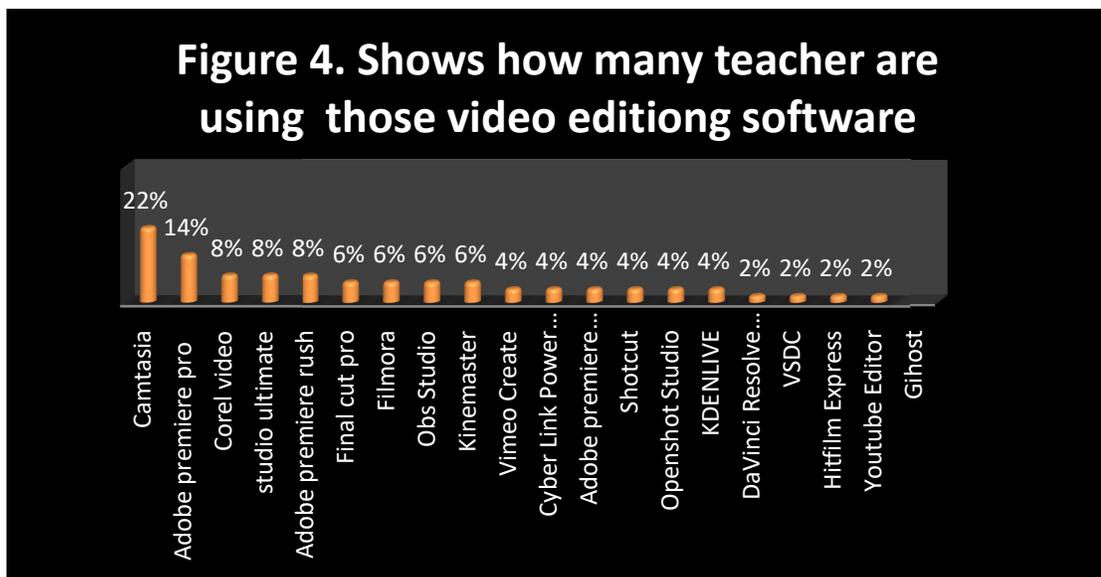
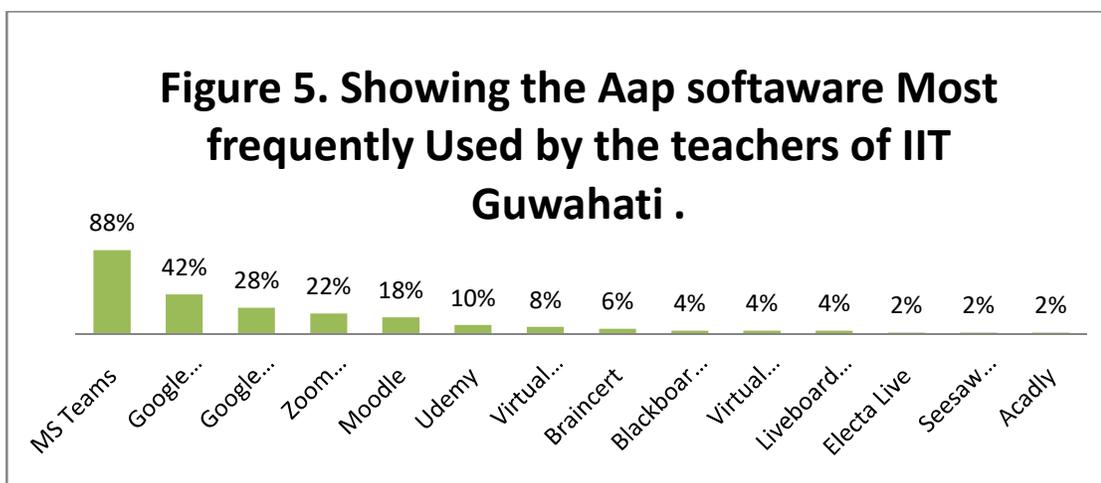


Table 7. Shows app Software that IIT Teachers frequently used for online class (N=50)

Sl.No	Name of Apps Classroom Meeting	Frequency	Percentage
a.	Google Classroom	14	28%
b.	Virtual Classroom	4	8%
c.	Blackboard Collaborate	2	4%
d.	Virtual Blackboard	2	4%
e.	Wz talks Webinar	0	0%
f.	Liveboard Interactive Whiteboard	2	4%
g.	Moodle	9	18%
h.	Electa Live	1	2%
i.	Udemy	5	10%
j.	Eliademy	0	0%
k.	WiziQ	0	0%
l.	Braincert	3	6%
m.	Zoom Meeting	11	22%
n.	Google Meet	21	42%
o.	Seesaw Class	1	2%
p.	MS Teams	44	88%
q.	Acadly	1	2%

Source: Questionnaire Survey 2021

From the above table 7 it is seen that, 88% teachers use MS Teams Application in IIT Guwahati most of the teacher prefer this Application for the online learning. And around 42% use Google meet frequently for the online classes then 28% use Google Classroom for conducting the classes online. And 22% of teachers in IIT Guwahati use Zoom Meeting, some of teachers 18% use Moodle aap, ten percent (10%) use Udemy, eight (8%) use Virtual Classroom, six percent (6%) use Braincert, four percent (4%) use Blackboard Collaborate, Virtual Blackboard, Liveboard Interactive Whiteboard and 2% use Electa Live, Seesaw Class, Acadly. Therefore MS Team is the software found to be mostly used by teachers in IIT Guwahati to conduct their classes online and share the content for Flipped classroom Approach.



4.4 ANALYSIS ON PERCEPTIONS OF TEACHERS TOWARDS FLIPPED CLASSROOM IN IIT GUWAHATI: This particular section contains the following questionnaire and to achieve this objective, the researchers have put 14 statements. The researchers have made statements to study the Perceptions of Teachers towards Flipped Classroom. Each statement had 5 options, i.e. Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree the results are as follows.

Objective 3. To study the perceptions of the teachers of IIT Guwahati on Flipped Classroom

Table.8. Showing the Perception of Teachers towards Flipped Classroom

Sl No	Statement	SD	D	UD	A	SA
1.	The flipped classroom gives greater opportunities to communicate with other students	1(2%)	3(6%)	19(38%)	25(50%)	2(4%)
2.	Absent Students benefit from a flipped classroom	2(4%)	5(10%)	15(30%)	22(44%)	6(12%)
3.	The flipped classroom is difficult for some students to	3(6%)	2(4%)	18(36%)	23(46%)	4(8%)

	access due to the additional technology required outside the classroom					
4.	The flipped classroom is difficult for some students to access due to the additional technology required outside the classroom	2(4%)	3(6%)	20(40%)	19(38%)	6(12%)
5.	Time created for in-class activities in the flipped classroom allows for more active learning and increased higher order thinking for students	1(2%)	2(4%)	21(42%)	25(50%)	2(4%)
6.	Student discipline issues decrease in a flipped classroom	0(0%)	6(12%)	26(52%)	14(28%)	4(8%)
7.	Students do not need the teacher present for direct instruction, but students need the teacher present for solving problems	1(2%)	5(10%)	17(34%)	23(46%)	4(8%)
8.	Flipping the classroom removes passive learning from the classroom	0(0%)	4(8%)	14(28%)	29(58%)	3(6%)
9.	The flipped classroom allows teachers more time to personalize instruction for students	0(0%)	4(8%)	17(34%)	26(52%)	3(6%)
10.	Students learn better in a flipped classroom	3(6%)	1(2%)	34(68%)	12(24%)	0(0%)

11.	In flipped classroom students have a sense of responsibility for their learning and come prepared to class	1(2%)	3(6%)	20(40%)	24(48%)	2(4%)
12.	The flipped classroom allows students to develop better relationships with their peers through co-operation and collaboration	1(2%)	2(4%)	15(30%)	30(60%)	2(4%)
13.	The flipped classroom allows teachers to have increased interaction with students.	0(0%)	5(10%)	15(30%)	27(54%)	3(6%)
14.	Flipping the classroom creates time for direct instruction, active learning activities, and content coverage.	1(2%)	3(6%)	16(32%)	29(58%)	1(2%)

Source: Questionnaire Survey 2021. The figures given in the bracket are percentage

The 2% of teacher are Strongly Disagree that the flipped classroom gives greater opportunities to communicate with other students and six percent (6%) are Disagree with this statement and thirty eight (38%) are Neither Agree nor Disagree, Majority of the teacher 50% Agree that flipped classroom gives greater opportunities to communicate with other students in the classroom and around 4% is Strongly Agree with statement 1. Then 4% are Strongly Disagree with the statement 2, and around 10% are Disagree, thirty percent (30%) are Neither Agree nor Disagree, most of the teacher 44% are Agree that Absent Students benefit from a flipped classroom and only 12% is Strongly Agree with statement 2. Now The 6% are Strongly Disagree, four percent (4%) are Disagree, and 36% are Neither Agree nor Disagree, 46% are Agree with the statement that the flipped classroom is difficult for some students to access due to the additional technology required outside the classroom and 8% is Strongly Agree with statement 3. The 4% of teacher are Strongly Disagree that flipped classroom is difficult for some students to access due to the additional technology required outside the classroom, six percent (6%)

are Disagree, forty percent (40%) are Neither Agree nor Disagree, and 38% are Agree and only 12% is Strongly Agree with this statement. The 2% are Strongly Disagree, four percent (4%) are Disagree, forty two (42%) are Neither Agree nor Disagree, fifty (50%) are Agree and 4% is Strongly Agree that Time created for in-class activities in the flipped classroom allows for more active learning and increased higher order thinking for students. Twelve percent (12%) are Disagree, then 52% are Neither Agree nor Disagree, around 28% are Agree and 8% is Strongly Agree that Student discipline issues decrease in a flipped classroom. The 2% are Strongly Disagree, around 10% are Disagree, and 34% are Neither Agree nor Disagree, forty six (46%) most of the teacher are Agree that Students do not need the teacher present for direct instruction, but students need the teacher present for solving problems and 8% is Strongly Agree. And 8% are Disagree, twenty eight percent (28%) are Neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom removes passive learning from the classroom and 6% is Strongly Agree with statement 8.

Around 8% are Disagree that the flipped classroom allows teachers more time to personalize instruction for students, and 34% are neither Agree nor Disagree, but 52% are Agree and 6% is Strongly Agree with statement 9. Around 6% are Strongly Disagree, only 2% are Disagree, majority of 68% teacher are in position that they are Neither Agree nor Disagree that students learn better in a flipped classroom, around 24% are also Agree with statement 10. The 2% are Strongly Disagree, only 6% are Disagree, 40% are Neither Agree nor Disagree, majority of teachers 48% are Agree that In flipped classroom students have a sense of responsibility for their learning and come prepared to class and few teachers 4% is Strongly Agree with statement 11. The 2% are Strongly Disagree, only some of teachers 4% are Disagree, around 30% are Neither Agree nor Disagree, majority 60% are Agree that flipped classroom allows students to develop better relationships with their peers through co-operation and collaboration and 4% is Strongly Agree with statement 12. The, 10% are Disagree, around 30% are neither Agree nor Disagree, majority of teachers 54% are Agree that flipped classroom allows teachers to have increased interaction with students and 6% is Strongly Agree with statement 13. Only few teachers 2% are Strongly Disagree, then around 6% is Disagree, thirty two (32%) are neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the

classroom creates time for direct instruction, active learning activities, and content coverage and 2% is Strongly Agree with statement 14.

4.5 ANALYSIS ON PERCEPTIONS OF TEACHERS ON FLIPPED CLASSROOM TOWARDS ADVANTAGES AND DISADVANTAGES

Objectives 4. To study the perceptions of teachers of IIT Guwahati on advantages and disadvantages of Flipped classroom.

Teacher of IIT Guwahati thinks flipped classroom makes better understanding of the topic and as content are introduced before the classroom so students come prepared to the classroom. In flipped classroom during classroom time there is a more interaction and group discussion so students develop higher order thinking, problem solving capacity increases also more interaction among the students increase and they will be thinking independently. Teachers believed that it is a child-centered or student-centered so most of the activities are done by a student which creates curiosity of learning among the students in this approach. Readymade videos can be used in this method so it helps in saving of teacher's time and covers the syllabus in less time. Contents are made available through online so contents are more accessible.

Students are not willing often as they do not prepare, and sometimes basic understanding of the students may go wrong, there must be a timeline for executing each task or activity, Blackboard teaching has no alternatives. Students learn more while taking notes from board. This is a beat in soft teaching. Also, the complete set of question focuses on students. It should see the instructors' side. Teaching in classroom is very pleasant for instructor, and hence the quality of teaching is better. Increase digital divide among students, dealing with technical challenges become difficult. Some students faced problems with internet and technology some students unable to watch video due to lack of internets. Difficult to handle electronic devices floating assignment is one of the disadvantages faced by teachers. It cannot be implemented in every subject because not all content can be taught using this method. Teachers feel that it is not suitable for large size. Highly mathematical subjects are difficult to be carried out in flipped classroom

approach. Due to use of more videos and online it makes more stress on eyes. According to the perception of teachers flipped classroom will be useful for other subjects and they suggest that it will be helpful in subjects where prior background is not required. Few subjects can use flipped classroom teaching. Introductory subjects with less theory component. may be practical based courses only. In principle it can be used for any subject other than those involves extensive mathematic exposition. It can be adopted for more advance subjects other than elementary courses. Will be useful for design courses where ample video content is available for pre-learning, but for other cases, the teacher has to dedicate a lot of time in developing content. Maybe it would be good for non-technical classroom. Yes, but flipped classroom is not applicable for all subject.

4.6 Recommendation to improve learning in the Flipped classroom

Teachers of IIT Guwahati recommends that smaller class size improved implication and dedicated students also suggest that there should be cross questioning after the discussion. Flipped classroom should be occasional rather than regular. For discussion forming group of similar caliber students will be more effective. Recorded videos would be better then lives videos. Some teachers also say that it would be better if content can be introduced during classroom time. Better internet connectivity for everyone it would be great if each individual will have a brief summary of topic beforehand. That would make the teaching learning transaction very smooth. Some of the Teachers in this institute are still experimenting Flipped classroom so they cannot suggestions and improve. There must be a timeline for executing each task or activity

Flipped classroom help both teacher and student in learning and growing together. Excellent initiative but it should be implemented while teaching care of all factors such as how to conduct exams effectively without cheating. It will be successful with bright and responsible students. India students are used to spoon feeding hence, it may not work here. Success of teaching learning depends on the instructors and faculty. Some teacher also says that Physical classroom teaching is always better. Students, parents and teacher have equal responsibilities to make flipped classroom a success.

CHAPTER-V

MAJOR FINDING, DISCUSSION AND SUGGESTIONS FOR FURTHER STUDIES

In this chapter, findings, discussions of major findings, recommendations and suggestions for further research are presented.

Findings: The findings of the study are arranged as under:

- i) Findings related to Infrastructural and instructional facilities on Flipped Classroom available in IIT Guwahati.
- ii) Findings related to Softwares use by the teachers of IIT Guwahati in teaching through Flipped Classroom.
- iii) Findings related to perceptions of the teachers of IIT Guwahati on Flipped Classroom Teaching Approach
- iv) Findings related to Perceptions of teachers of IIT Guwahati on advantages and disadvantages of Flipped classroom.

5.0 Findings related to Infrastructural and instructional facilities on Flipped Classroom available in IIT Guwahati.

- a) It was found that in 11 departments of IIT Guwahati, all the departments have the adequate computers, LCD Projectors, White Screen, Camera and computer Lab. For Recording there is one common recording room for whole department in campus and separate Studio is available for Design Department. Also Wi-Fi is available in every department and in hostel.
- b) The study reveals that 8% of computers are not used in IIT Guwahati and 12% several people share one computer in their classroom or department. Majority of the people 78% used one computer per person. And only 2% of computers are using two or more computer per person. Thus most of the people used one computer per person in IIT Guwahati.

- c) Study reveals that 48% of teacher introduced the content in form Pdf before classroom while teaching flipped classroom approach. And 32% share their content in Video to the students; only around 10% each share in form of audio and Microsoft Word.
- d) In this study it was found that 60 % of teachers in IIT Guwahati are using flipped classroom approach and around 40% are not using Flipped Classroom Approach. Most of the teacher those who are using Flipped Classroom approach they had been using this approach since 2 years.

5.1 Findings related to Softwares use by the teachers of IIT Guwahati in teaching through Flipped Classroom.

- a) Majority of teachers Around 22% use Camtasia video editing software and some of teachers 14% use Adobe premiere pro and only 8% use Corel video, studio ultimate, Adobe premiere rush, then 6% use Final cut pro, Filmora, Obs Studio, Kinemaster, only 4% of teachers use Vimeo Create, Cyber Link Power Director, Adobe premiere elements, Shotcut, Openshot Studio, KDENLIVE, very few teacher 2% use DaVinci Resolve Light works, VSDC, Hitfilm Express, Youtube Editor, Gihost,
- b) It was found that, 88% teachers use MS Teams Application in IIT Guwahati most of the teacher prefer this Application for the online learning. And around 42% use Google meet frequently for the online classes then 28% use Google Classroom for conducting the classes online. And 22% of teachers in IIT Guwahati use Zoom Meeting, some of teachers 18% use Moodle aap, ten percent (10%) use Udemy, eight (8%) use Virtual Classroom, six percent (6%) use Braincert, four percent (4%) use Blackboard Collaborate, Virtual Blackboard, Liveboard Interactive Whiteboard and 2% use Electa Live, Seesaw Class, Acadly. Therefore MS Team is the software found to be mostly used by teachers in IIT Guwahati to conduct their classes online and share the content for Flipped classroom Approach.

5.2 Findings related to perceptions of the teachers of IIT Guwahati on Flipped Classroom Teaching Approach

Based on result of this study it was found that 2% of teacher are Strongly Disagree that the flipped classroom gives greater opportunities to communicate with other students and six percent (6%) are Disagree with this statement and thirty eight (38%) are Neither Agree nor Disagree, Majority of the teacher 50% Agree that flipped classroom gives greater opportunities to communicate with other students in the classroom and around 4% is Strongly Agree with statement 1. Then 4% are Strongly Disagree with the statement 2 , and around 10% are Disagree, thirty percent (30%) are Neither Agree nor Disagree, most of the teacher 44% are Agree that Absent Students benefit from a flipped classroom and only 12% is Strongly Agree with statement 2. Now The 6% are Strongly Disagree, four percent (4%) are Disagree, and 36% are Neither Agree nor Disagree, 46% are Agree with the statement that the flipped classroom is difficult for some students to access due to the additional technology required outside the classroom and 8% is Strongly Agree with statement 3. The 4% of teacher are Strongly Disagree that flipped classroom is difficult for some students to access due to the additional technology required outside the classroom, six percent (6%) are Disagree, forty percent (40%) are Neither Agree nor Disagree, and 38% are Agree and only 12% is Strongly Agree with this statement. The 2% are Strongly Disagree, four percent (4%) are Disagree, forty two (42%) are Neither Agree nor Disagree, fifty (50%) are Agree and 4% is Strongly Agree that Time created for in-class activities in the flipped classroom allows for more active learning and increased higher order thinking for students. Twelve percent (12%) are Disagree, then 52% are Neither Agree nor Disagree, around 28% are Agree and 8% is Strongly Agree that Student discipline issues decrease in a flipped classroom. The 2% are Strongly Disagree, around 10% are Disagree, and 34% are Neither Agree nor Disagree, forty six (46%) most of the teacher are Agree that Students do not need the teacher present for direct instruction, but students need the teacher present for solving problems and 8% is Strongly Agree. And 8% are Disagree, twenty eight percent (28%) are Neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom removes passive learning from the classroom and 6% is Strongly Agree with statement 8.

Around 8% are Disagree that the flipped classroom allows teachers more time to personalize instruction for students, and 34% are neither Agree nor Disagree, but 52% are Agree and 6% is Strongly Agree with statement 9. Around 6% are Strongly Disagree, only 2% are Disagree, majority of 68% teacher are in position that they are Neither Agree nor Disagree that students learn better in a flipped classroom, around 24% are also Agree with statement 10. The 2% are Strongly Disagree, only 6% are Disagree, 40% are Neither Agree nor Disagree, majority of teachers 48% are Agree that In flipped classroom students have a sense of responsibility for their learning and come prepared to class and few teachers 4% is Strongly Agree with statement 11. The 2% are Strongly Disagree, only some of teachers 4% are Disagree, around 30% are Neither Agree nor Disagree, majority 60% are Agree that flipped classroom allows students to develop better relationships with their peers through co-operation and collaboration and 4% is Strongly Agree with statement 12. The, 10% are Disagree, around 30% are neither Agree nor Disagree, majority of teachers 54% are Agree that flipped classroom allows teachers to have increased interaction with students and 6% is Strongly Agree with statement 13. Only few teachers 2% are Strongly Disagree, then around 6% is Disagree, thirty two (32%) are neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom creates time for direct instruction, active learning activities, and content coverage and 2% is Strongly Agree with statement 14.

5.3 Findings related to Perceptions of teachers of IIT Guwahati on advantages and disadvantages of Flipped classroom.

a) As an advantage Study reveals that according to the teachers of IIT Guwahati flipped classroom makes better understanding of the topic and as content are introduced before the classroom so students come prepared to the classroom. In flipped classroom during classroom time there is a more interaction and group discussion so students develop higher order thinking, problem solving capacity increases also more interaction among the students increase and they will be thinking independently. Also it is a student-centered so most of the activities are done by a student which creates curiosity of learning among the students in this approach. Readymade videos can be used in this method so it helps in saving of teacher's time and covers the syllabus in less time. Contents are made available through online so contents are more accessible.

b) It was found that in this approach as a disadvantage according to the teacher of IIT Guwahati Students are not willing often as they do not prepare, and sometimes basic understanding of the students may go wrong, there is no timeline for executing each task or activity, Blackboard teaching has no alternatives. Students learn more while taking notes from board. This is a beat in soft teaching. Also, the complete set of question focuses on students. It should see the instructors' side. Teaching in classroom is very pleasant for instructor, and hence the quality of teaching is better. Increase digital divide among students, dealing with technical challenges become difficult. Some students faced problems with internet and technology some students unable to watch video due to lack of internets. Difficult to handle electronic devices floating assignment is one of the disadvantages faced by teachers. It cannot be implemented in every subject because not all content can be taught using this method. Teachers feel that it is not suitable for large size. Highly mathematical subjects are difficult to be carried out in flipped classroom approach. Due to use of more videos and online it makes more stress on eyes.

c) According to some of the teachers flipped classroom will be useful for other subjects and they suggest that it will be helpful in subjects where prior background is not required. Few subjects can use flipped classroom teaching. Introductory subjects and subjects with less theory component. May be practical based courses only. In principle it can be used for any subject other than those involves extensive mathematic exposition. Can be adopted for more advance subjects other than elementary courses. Will be useful for design courses where ample video content is available for pre-learning, but for other cases, the teacher has to dedicate a lot of time in developing content. Maybe it would be good for non-technical classroom. Flipped classroom is useful for other some subject but not applicable for all subjects.

5.4 Recommendation to improve learning in the Flipped classroom

a) Teachers of IIT Guwahati recommends that smaller class size improved implication and also suggest that there should be a cross questioning after the discussion. Flipped classroom should be occasional rather than regular. For discussion forming group of similar caliber students will be more effective. Recorded videos would be better then lives videos. Some teachers also say that it would be better if content can be introduced

during classroom time. Better internet connectivity for everyone it would be great if each individual will have a brief summary of topic beforehand. That would make the teaching learning transaction very smooth. Some of the Teachers in this institute are still experimenting Flipped classroom so they cannot suggest. There must be a timeline for executing each task or activity

b) Flipped classroom help both teacher and student in learning and growing together. Excellent initiative but it should be implemented while teaching care of all factors such as how to conduct exams effectively without cheating. It will be successful with bright and responsible students. India students are used to be spoon feeding hence, it may not work here. Success of teaching learning depends on the instructors and faculty. Some teacher also says that Physical classroom teaching is always better. Students, parents and teacher have equal responsibilities to make flipped classroom a success.

CHAPTER-VI

SUMMARY AND CONCLUSION

6.0 Introduction

The development of the society implies developing in all the fields of life. The development of the nation may be judged from the use of modern technologies in the production sectors, the per capita income of its citizens and the ability of the nation to compete itself in the international market especially in the IT sectors. But in order to achieve the above cited criteria, the standard of education that it imparted to its citizens has to be taken into consideration. The quality of education depends much on the availability of the competent and dedicated teachers, the right motivation of the students and also the structures and methods used to enhance the teaching learning process.

Education is one field that is constantly changing and adopting new approaches, methods and techniques to meet the needs and demand of the dynamic society for the students. The development of ICT as a learning has raised the education level in all countries and it has changed the way students are being taught at schools and colleges. Due to the popularity of ICT technology the learning habits of students are changing everyday with the new technologies. So, in this 21st Century new approaches play vital role to match the habits of students with technologies. In which Flipped Classroom is one of the new approach which is based on the needs and demand of current interest of students learning.

What is Flipped Classroom?

The “Flip” means moving lectures from the class to pre-class homework, while reserving class time for having students to do the problems and exercises that have traditionally been the domain of out-of-class assignments. Actual “Flipped Classroom” is that new ICT Technologies make it easy to convert instructor lectures through digital recordings and place these online for students’ access outside of face-to-face class time. As a result, students can review lectures in advance of the regular class, then have class sessions for working together on the assignments that traditionally have been done as homework. Not

only are students seen as gaining through working together or “homework” problems in class, but instructors are able to more quickly see where students are struggling and provide remedial support.

According to the Flipped Learning Network (2014), “Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter”

6.1 Rationale of the Study

The aim of this study was to discover teachers’ perceptions of using the flipped classroom rather than a more traditional instructional method. It was also attempt to find out the teacher perception of effectiveness, appropriateness for the subject matter and motivation behind using the flipped classroom. And it also study the availability of infrastructure facilities and what are the instructional approaches carried out in this institution. The study was also significant because it will throw light on the functioning and efficiency of the IIT Guwahati Assam. And this study also intends to know the Present Status and implementation of the Flipped classroom. Since 2015 IIT Guwahati was using the Flipped classroom approach, so ICT technology had been developed very fast and many advanced technologies are available in today’s 21st century for that, this study was to examine the software availability and technology used in the study area. The study also mostly focus on the teachers since it is a new approach so the teacher is the one who instruct and implement this approach for that this study tends to know the teachers’ point of view in the sense advantages and disadvantages of this approach during the implementation of Flipped classroom. The study was very significant because it was the first kind of research being done on the field of education in this institution of IIT Guwahati Assam especially on the issue of Flipped Classroom Approach.

6.2 Statement of the Problem:

“FLIPPED CLASSROOM IN IIT GUWAHATI: STATUS AND PERCEPTIONS OF TEACHERS”

6.3 Objectives of the Study:

1. To study the infrastructural and instructional facilities on Flipped Classroom available in IIT Guwahati.
2. To find out the softwares use by the teachers of IIT Guwahati in teaching through Flipped Classroom.
3. To study the perceptions of the teachers of IIT Guwahati on Flipped Classroom Teaching Approach.
4. To study the perceptions of teachers of IIT Guwahati on advantages and disadvantages of Flipped classroom.

6.4 Research Questions

1. What are the infrastructural and instructional facilities available in IIT Guwahati on flipped classroom?
2. What are the softwares using by the IIT Guwahati teachers for flipped classroom model?
3. What are the perceptions of teachers of IIT Guwahati on Flipped classroom teaching approach?
4. What are the perceptions of teachers of IIT Guwahati on advantages and disadvantages of flipped classroom?

6.5 Operational Definitions of the Key terms

Flipped Classroom: A Flipped classroom is one where students are introduced to content at home and practice working through those concepts at school.

IIT Guwahati : Indian Institute of Technology Guwahati (IIT Guwahati) is a public technical and research university established by the Government of India, located in Guwahati, in the state of Assam in India. It is the sixth Indian Institute of Technology established in India. IIT Guwahati is officially recognized as an Institute of National Importance by the government of India. IIT Guwahati has been ranked 7th both in Engineering and Overall category in NIRF India Rankings 2020, released on 11th June 2020.

Teachers: Teachers in this study indicates the teachers those who are currently teaching in the various department of IIT Guwahati Campus. Teachers are both male and female teachers.

6.6 Delimitation of the Study

The present study was delimited to IIT Guwahati Teachers only.

6.7 Research Method:

Out of various methods of educational research for the present study the researcher has employed descriptive survey method of educational research.

6.8 Population: The population of the study includes all the teachers of IIT Guwahati.

6.9 Sample of the study: At present there are 410 faculties in IIT Guwahati. Presently there are 11 departments in IIT Guwahati where flipped classrooms are in operational. From each department teachers were selected as sample of the study. Out of 110 teachers 50 teachers were selected. Simple random sampling procedure has been adopted to select the teachers for the study.

6.10 Tool and Techniques Used for Data Collection

For Research study, the researcher has collected on the basis of that data. The researcher Draws good conclusions and gives some generalization. The selection of tools for particular depends upon the objectives Drawn for the study. In the present study the researcher has used self Developed tools to collect information on the Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers.

1. A checklist was developed by the researcher to collect the information about the status of Flipped classroom in IIT Guwahati.
2. A questionnaire was developed to reveal the perceptions of the teachers on advantages and disadvantages of flipped classroom.

6.11 Procedure of Data Collection: The researcher took the permission from concern HODs of various departments for selection of teachers for the collection of data. Then researcher administered the questionnaire and collects the information from the teachers of various departments of IIT Guwahati. Then Researcher went to the each teacher's room then explains the purpose and procedure of the questionnaire and the questionnaire were supplied to the teachers and they were asked to fill the necessary entries like Name, sex, Qualifications, in the front page of the Questionnaire. The researcher told the teachers that set of questions formulated with the purpose of seeking their opinion with regard to the Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers. Each question is supplied with set of answers and you need to choose from the given choices the ones that apply to you or simply follow the instructions that will be given after each question. Your kind cooperation will be much esteemed. The confidentiality of your responses was guaranteed by the researcher. The research was administered successfully.

6.12 Procedure of Data Analysis

The pattern of analysis followed the requirements outlined in the statement of objectives and various research questions. Descriptive type of work was done to report the results of the Study on Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers. The teachers were mainly selected from the entire 11 department on Random Sampling techniques. And questionnaire was distributed to 50 teachers then according to their responses the percentage method was employed to analyze the following data.

6.13 Findings: The findings of the study are

1. It was found that in 11 departments of IIT Guwahati, all the departments have the adequate computers, LCD Projectors, White Screen, Camera and computer Lab. For Recording there is one common recording room for whole department in campus and separate Studio is available for Design Department. Also Wi-Fi is available in every department and in hostel.
- e) The study reveals that 8% of computers are not used in IIT Guwahati and 12% several people share one computer in their classroom or department. Majority of the

people 78% used one computer per person. And only 2% of computers are using two or more computer per person. Thus most of the people used one computer per person in IIT Guwahati.

f) The table shows that 48% of teacher introduced the content in form Pdf before classroom while teaching flipped classroom approach. And 32% share their content in Video to the students; only around 10% each share in form of audio and Microsoft Word.

g) In this study it was found that 60 % of teachers in IIT Guwahati are using flipped classroom approach and around 40% are not using Flipped Classroom Approach. Most of the teacher those who are using Flipped Classroom approach they had been using this approach since 2 years.

c) Majority of teachers Around 22% use Camtasia video editing software and some of teachers 14% use Adobe premiere pro and only 8% use Corel video, studio ultimate, Adobe premiere rush, then 6% use Final cut pro, Filmora, Obs Studio, Kinemaster, only 4% of teachers use Vimeo Create, Cyber Link Power Director, Adobe premiere elements, Shotcut, Openshot Studio, KDENLIVE, very few teacher 2% use DaVinci Resolve Light works, VSDC, Hitfilm Express, Youtube Editor, Gihost,

d) It was found that, 88% teachers use MS Teams Application in IIT Guwahati most of the teacher prefer this Application for the online learning. And around 42% use Google meet frequently for the online classes then 28% use Google Classroom for conducting the classes online. And 22% of teachers in IIT Guwahati use Zoom Meeting, some of teachers 18% use Moodle aap, ten percent (10%) use Udemy, eight (8%) use Virtual Classroom, six percent (6%) use Braincert, four percent (4%) use Blackboard Collaborate, Virtual Blackboard, Liveboard Interactive Whiteboard and 2% use Electa Live, Seesaw Class, Acadly. Therefore MS Team is the software found to be mostly used by teachers in IIT Guwahati to conduct their classes online and share the content for Flipped classroom Approach.

e) Based on result of this study it was found that 2% of teacher are Strongly Disagree that the flipped classroom gives greater opportunities to communicate with other students and six percent (6%) are Disagree with this statement and thirty eight (38%) are Neither Agree nor Disagree, Majority of the teacher 50% Agree that flipped classroom gives greater opportunities to communicate with other students in the classroom and

around 4% is Strongly Agree with statement 1. Then 4% are Strongly Disagree with the statement 2, and around 10% are Disagree, thirty percent (30%) are Neither Agree nor Disagree, most of the teacher 44% are Agree that Absent Students benefit from a flipped classroom and only 12% is Strongly Agree with statement 2. Now The 6% are Strongly Disagree, four percent (4%) are Disagree, and 36% are Neither Agree nor Disagree, 46% are Agree with the statement that the flipped classroom is difficult for some students to access due to the additional technology required outside the classroom and 8% is Strongly Agree with statement 3. The 4% of teacher are Strongly Disagree that flipped classroom is difficult for some students to access due to the additional technology required outside the classroom, six percent (6%) are Disagree, forty percent (40%) are Neither Agree nor Disagree, and 38% are Agree and only 12% is Strongly Agree with this statement. The 2% are Strongly Disagree, four percent (4%) are Disagree, forty two (42%) are Neither Agree nor Disagree, fifty (50%) are Agree and 4% is Strongly Agree that Time created for in-class activities in the flipped classroom allows for more active learning and increased higher order thinking for students. Twelve percent (12%) are Disagree, then 52% are Neither Agree nor Disagree, around 28% are Agree and 8% is Strongly Agree that Student discipline issues decrease in a flipped classroom. The 2% are Strongly Disagree, around 10% are Disagree, and 34% are Neither Agree nor Disagree, forty six (46%) most of the teacher are Agree that Students do not need the teacher present for direct instruction, but students need the teacher present for solving problems and 8% is Strongly Agree. And 8% are Disagree, twenty eight percent (28%) are Neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom removes passive learning from the classroom and 6% is Strongly Agree with statement 8.

Around 8% are Disagree that the flipped classroom allows teachers more time to personalize instruction for students, and 34% are neither Agree nor Disagree, but 52% are Agree and 6% is Strongly Agree with statement 9. Around 6% are Strongly Disagree, only 2% are Disagree, majority of 68% teacher are in position that they are Neither Agree nor Disagree that students learn better in a flipped classroom, around 24% are also Agree with statement 10. The 2% are Strongly Disagree, only 6% are Disagree, 40% are Neither Agree nor Disagree, majority of teachers 48% are Agree that In flipped classroom students have a sense of responsibility for their learning and come prepared to class and

few teachers 4% is Strongly Agree with statement 11. The 2% are Strongly Disagree, only some of teachers 4% are Disagree, around 30% are Neither Agree nor Disagree, majority 60% are Agree that flipped classroom allows students to develop better relationships with their peers through co-operation and collaboration and 4% is Strongly Agree with statement 12. The, 10% are Disagree, around 30% are neither Agree nor Disagree, majority of teachers 54% are Agree that flipped classroom allows teachers to have increased interaction with students and 6% is Strongly Agree with statement 13. Only few teachers 2% are Strongly Disagree, then around 6% is Disagree, thirty two (32%) are neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom creates time for direct instruction, active learning activities, and content coverage and 2% is Strongly Agree with statement 14.

f) As an advantage Study reveals that according to the teachers of IIT Guwahati flipped classroom makes better understanding of the topic and as content are introduced before the classroom so students come prepared to the classroom. In flipped classroom during classroom time there is a more interaction and group discussion so students develop higher order thinking, problem solving capacity increases also more interaction among the students increase and they will be thinking independently. Also it is a student-centered so most of the activities are done by a student which creates curiosity of learning among the students in this approach. Readymade videos can be used in this method so it helps in saving of teacher's time and covers the syllabus in less time. Contents are made available through online so contents are more accessible.

g) It was found that in this approach as a disadvantage according to the teacher of IIT Guwahati Students are not willing often as they do not prepare, and sometimes basic understanding of the students may go wrong, there is no timeline for executing each task or activity, Blackboard teaching has no alternatives. Students learn more while taking notes from board. This is a beat in soft teaching. Also, the complete set of question focuses on students. It should see the instructors' side. Teaching in classroom is very pleasant for instructor, and hence the quality of teaching is better. Increase digital divide among students, dealing with technical challenges become difficult. Some students faced problems with internet and technology some students unable to watch video due to lack of internets. Difficult to handle electronic devices floating assignment is one of the

disadvantages faced by teachers. It cannot be implemented in every subject because not all content can be taught using this method. Teachers feel that it is not suitable for large size. Highly mathematical subjects are difficult to be carried out in flipped classroom approach. Due to use of more videos and online it makes more stress on eyes.

h) According to some of the teachers flipped classroom will be useful for other subjects and they suggest that it will be helpful in subjects where prior background is not required. Few subjects can use flipped classroom teaching. Introductory subjects and subjects with less theory component. May be practical based courses only. In principle it can be used for any subject other than those involves extensive mathematic exposition. Can be adopted for more advance subjects other than elementary courses. Will be useful for design courses where ample video content is available for pre-learning, but for other cases, the teacher has to dedicate a lot of time in developing content. Maybe it would be good for non-technical classroom. Flipped classroom is useful for other some subject but not applicable for all subjects.

i) Teachers of IIT Guwahati recommends that smaller class size improved implication and also suggest that there should be a cross questioning after the discussion. Flipped classroom should be occasional rather than regular. For discussion forming group of similar caliber students will be more effective. Recorded videos would be better then lives videos. Some teachers also say that it would be better if content can be introduced during classroom time. Better internet connectivity for everyone it would be great if each individual will have a brief summary of topic beforehand. That would make the teaching learning transaction very smooth. Some of the Teachers in this institute are still experimenting Flipped classroom so they cannot suggest. There must be a timeline for executing each task or activity

j) Flipped classroom help both teacher and student in learning and growing together. Excellent initiative but it should be implemented while teaching care of all factors such as how to conduct exams effectively without cheating. It will be successful with bright and responsible students. India students are used to be spoon feeding hence, it may not work here. Success of teaching learning depends on the instructors and faculty. Some teacher also says that Physical classroom teaching is always better. Students, parents and teacher have equal responsibilities to make flipped classroom a success.

6.14 Educational Implications

The study has emerged many educational implications for the policy makers, teachers, teacher educators and students. The perceptions from the teachers of IIT Guwahati will help in quality improvement of teaching learning process by adopting Flipped classroom approach. It will empower students participation in the classroom from the flipped classroom approach students can learn lessons through videos. The central government should take care about the perception of teachers of various departments of IIT Guwahati about the advantages of flipped classroom and should promote flipped classroom approach in other IITs, NITs, Technical Institutions, and Central Universities. The teachers of various departments should look to the disadvantages of flipped classroom and make a strategy to overcome these disadvantages.

The central government organized faculty development programme for teachers of different IITs, NITs, and Central Universities to train about flipped classroom approach. The findings of the study will help the researcher to conduct similar studies in different institutions.

6.15 Suggestions for Further studies

1. Similar studies may be conducted from larger sample for better autenticity and to validate the present findings.
2. The perceptions of other stakeholders like students, adminstratus, and other authorities may be studied
3. A comparative study of the status and implementation of flipped classroom of IIT and NIT may be carried out.
4. An analytical study may be conducted on flipped classroom in Central Universities of North-East India
5. An Experimental study may be conducted to find out the effectiveness of flipped classroom on academic achievement.

6.16 Conclusion The purpose of this study was to discover teachers' perceptions of using the flipped classroom rather than a more traditional instructional method. Based on the present study, it is concluded that flipped classroom is a recent innovation in the field

of education and IIT Guwahati is using this approach since 2015. So, the result of this study was found to be effective and infrastructure facilities are available in IIT Guwahati. In Present, this institution did not implement Flipped classroom Approach fully in all the departments. Flipped classroom itself has so many advantages but on the other hand disadvantages too. However, it is suggested that perceptions of students also should be studied to make clearer about the advantages and disadvantages on flipped classroom.

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APPENDIX-A
QUESTIONNAIRE

PERCEPTIONS OF TEACHER'S ON FLIPPED CLASSROOM

Dear Madam/Sir,

My self **Jumri Riba** M.Phil. Student, Department of Education, Mizoram University, conducting a research entitled “*Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers*” Under the Guidance of Prof.Lokanath Mishra. This questionnaire is meant to study the perceptions of teachers on Flipped Classroom. It is assumed that the information given by you only be used for study purpose. Please rest assures that your response will be kept strictly confidential and used for research purpose only. Read the question carefully before answering.

Jumri Riba
M.Phil. Scholar
Mizoram University
M-8730998315

PART-A

1.) **Name of the Teacher** _____

2.) **Designation**

Assistant Professor Associate Professor Professor

3.) **Gender** Male Female

4.) **Age Group: In Year**

Below 25 26-35 36-45 46-55 56-65

5.) **Qualification :** _____

6.) **Name of Department** _____

PART-B

Some statements are given below please put a tick ✓ mark in the appropriate answer and write your perceptions answer in the appropriate space.

1. Are you using flipped classroom?

- a) Yes
- b) No

If yes, how long have you been using Flipped Classroom?

Sl. No.	Period	✓
a.	Less than 1 years	
b.	Between 1 to 4 years	
c.	Between 5 to 8 years	
d.	Between 9 to 13 years	
e.	More than 13 years	

2. In what way are computers shared at your department / classroom?

- a) Computer are not used
- b) Several people share one computer
- c) One computer per person
- d) Two or more computer per person

3. The content are introduced before classroom in form of

- a) Pdf
- b) Video
- c) Audio
- d) Word

4. What are the video editing software that you frequently used? (Tick(✓)for all that apply)

Sl.No	Name Of Software	✓
v.	Vimeo create	
w.	Cyber Link Power Director	
x.	Adobe premiere elements	
y.	Final cut pro	
z.	Corel video studio ultimate	
aa.	Adobe premiere rush	
bb.	Filmora	
cc.	Pinnacle studio	
dd.	Adobe premiere pro	

ee.	Kinemaster	
ff.	DaVinci Resolve	
gg.	Light works	
hh.	VSDC	
ii.	Hitfilm Express	
jj.	Shotcut	
kk.	Camtasia	

Any other (please specify)

1. _____
2. _____
3. _____
4. _____

5. What are the app software that you frequently used for online class? (Tick (✓) for all that apply)

Sl.No	Name of Apps Classroom Meeting	✓
r.	Google Classroom	
s.	Virtual Classroom	
t.	Blackboard Collaborate	
u.	Virtual Blackboard	
v.	Wz talks Webinar	
w.	Liveboard Interactive Whiteboard	
x.	Moodle	
y.	Electa Live	
z.	Udemy	
aa.	Eliademy	
bb.	WizIQ	
cc.	Braincert	
dd.	Zoom Meeting	
ee.	Google Meet	
ff.	Seesaw Class	

Any other (please specify)

1. _____
2. _____

- 6. Do you utilize a flipped classroom with any of your subject?**
- a) Yes
 - b) No
- 7. What content area do you flip?**
- a) English/Language Arts
 - b) Math
 - c) Science
 - d) Social Studies
 - e) Other _____
- 8. The flipped classroom is more engaging than traditional classroom instruction**
- a) Strongly Disagree
 - b) Disagree
 - c) Neither Agree nor Disagree
 - d) Agree
 - e) Strongly Agree
- 9. The flipped classroom gives greater opportunities to communicate with other students**
- a) Strongly Disagree
 - b) Disagree
 - c) Neither Agree nor Disagree
 - d) Agree
 - e) Strongly Agree
- 10. Absent Students benefit from a flipped classroom.**
- a) Strongly Disagree
 - b) Disagree
 - c) Neither Agree nor Disagree
 - d) Agree
 - e) Strongly Agree
- 11. The flipped classroom is difficult for some students to access due to the additional technology required outside the classroom.**
- a) Strongly Disagree
 - b) Disagree
 - c) Neither Agree nor Disagree
 - d) Agree
 - e) Strongly Agree
- 12. Time created for in-class activities in the flipped classroom allows for more active learning and increased higher order thinking for students.**
- a) Strongly Disagree
 - b) Disagree
 - c) Neither Agree nor Disagree

- d) Agree
- e) Strongly Agree

13. Student discipline issues decrease in a flipped classroom

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

14. Students do not need the teacher present for direct instruction, but students need the teacher present for solving problems.

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

15. Flipping the classroom removes passive learning from the classroom

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

16. The flipped classroom allows teachers more time to personalize instruction for students

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

17. Students learn better in a flipped classroom

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

18. In flipped classroom students have a sense of responsibility for their learning and come prepared to class

- a) Strongly Disagree
- b) Disagree

- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

19. The flipped classroom allows students to develop better relationships with their peers through co-operation and collaboration.

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

20. The flipped classroom allows teachers to have increased interaction with students.

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

21. Flipping the classroom creates time for direct instruction, active learning activities, and content coverage.

- a) Strongly Disagree
- b) Disagree
- c) Neither Agree nor Disagree
- d) Agree
- e) Strongly Agree

22. What are the advantages of the flipped classroom?

23. What are the disadvantages of the Flipped classroom?

24. Would the flipped classroom be useful for other subjects? Why or why not?

25. What improvements would you recommend to improve learning in the Flipped classroom?

Please state any other comments you wish to make about the Flipped classroom.

APPENDIX-B
CHECKLIST

Department Name	Computers	LCD Projectors	White Screen	Recording Room	Studio	Camera	Wi-Fi	Computer Lab
Bioscience and Bioengineering								
Chemical Engineering								
Chemical Science and Technology								
Civil Engineering								
Computer Science and Engineering								
Design								
Electronics and Electrical Engineering								
Humanities and Social Sciences								
Mathematics								
Mechanical Engineering								
Physics								

APPENDIX-C
CERTIFICATE



RAJIV GANDHI UNIVERSITY
RONO HILLS, ARUNACHAL PRADESH, INDIA-791112



THREE DAY INTERNATIONAL WEBINAR ON
DIGITAL PEDAGOGY IN 21ST CENTURY: OPPORTUNITIES AND CHALLENGES

(JUNE, 25-27, 2020)

This is to certify that **Mr. JUMRI RIBA**, M.Phil Research Scholar, Mizoram University, Aizawl has participated and presented research paper titled **"A STUDY ON AWARENESS TOWARDS FLIPPED CLASSROOM APPROACH AMONG TERTIARY STUDENTS OF ARUNACHAL PRADESH"** in the International Webinar on Digital Pedagogy in 21st Century: Opportunities and Challenges held online during June, 25-27, 2020, organised by Department of Education, Rajiv Gandhi University, Arunachal Pradesh, India.

Prof. Rachob Taba
Dean, Faculty of Education

Prof. Kesang Degi
Head, Department of Education

Dr. Nisanth.P.M.
Co-ordinator

Mr. Narender Singh
Co-ordinator

Prof. Saket Kushwaha
Vice chancellor

APPENDIX-D

PLAGRISM CERTIFICATE



Document Information

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TITLE OF THE DISSERTATION : FLIPPED CLASSROOM IN IIT
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**FLIPPED CLASSROOM IN IIT GUWAHATI: STATUS AND
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AN ABSTRACT SUBMITTED IN PARTIAL FULFILLMENT FOR THE
DEGREE OF MASTER OF PHILOSOPHY IN EDUCATION

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ABSTRACT

**FLIPPED CLASSROOM IN IIT GUWAHATI: STATUS AND PERCEPTIONS OF
TEACHER**

BY

JUMRI RIBA

DEPARTMENT OF EDUCATION

Prof. LOAKANATH MISHRA

Submitted

**In partial fulfillment of the requirement of the Degree of Master of Philosophy in
Education of Mizoram University, Aizawl.**

Needs of the Study

The aim of this study was to discover teachers' perceptions of using the flipped classroom rather than a more traditional instructional method. It was also attempt to find out the teacher perception of effectiveness, appropriateness for the subject matter and motivation behind using the flipped classroom. And it also study the availability of infrastructure facilities and what are the instructional approaches carried out in this institution. The study was also significant because it will throw light on the functioning and efficiency of the IIT Guwahati Assam. And this study also intends to know the Present Status and implementation of the Flipped classroom. Since 2015 IIT Guwahati was using the Flipped classroom approach, so ICT technology had been developed very fast and many advanced technologies are available in today's 21st century for that, this study was to examine the software availability and technology used in the study area. The study also mostly focus on the teachers since it is a new approach so the teacher is the one who instruct and implement this approach for that this study tends to know the teachers' point of view in the sense advantages and disadvantages of this approach during the implementation of Flipped classroom. The study was very significant because it was the first kind of research being done on the field of education in this institution of IIT Guwahati Assam especially on the issue of Flipped Classroom Approach.

Statement of the Problem

“FLIPPED CLASSROOM IN IIT GUWAHATI: STATUS AND PERCEPTIONS OF TEACHERS”

Objectives of the Study

1. To study the infrastructural and instructional facilities on Flipped Classroom available in IIT Guwahati.
2. To find out the softwares use by the teachers of IIT Guwahati in teaching through Flipped Classroom.
3. To study the perceptions of the teachers of IIT Guwahati on Flipped Classroom Teaching Approach.

4. To study the perceptions of teachers of IIT Guwahati on advantages and disadvantages of Flipped classroom.

Research Questions

- 1). what are the infrastructural and instructional facilities available in IIT Guwahati on flipped classroom?
- 2). what are the softwares using by the IIT Guwahati teachers for flipped classroom model?
- 3). what are the perceptions of teachers of IIT Guwahati on Flipped classroom teaching approach?
- 4). what are the perceptions of teachers of IIT Guwahati on advantages and disadvantages of flipped classroom?

Operational Definitions of the Key terms

Flipped Classroom: A Flipped classroom is one where students are introduced to content at home and practice working through those concepts at school.

IIT Guwahati : Indian Institute of Technology Guwahati (IIT Guwahati) is a public technical and research university established by the Government of India, located in Guwahati, in the state of Assam in India. It is the sixth Indian Institute of Technology established in India. IIT Guwahati is officially recognized as an Institute of National Importance by the government of India. IIT Guwahati has been ranked 7th both in Engineering and Overall category in NIRF India Rankings 2020, released on 11th June 2020.

Teachers: Teachers in this study indicates the teachers those who are currently teaching in the various department of IIT Guwahati Campus. Teachers are both male and female teachers.

Methodology

Out of various methods of educational research for the present study the researcher has employed descriptive survey method of educational research.

Population: The population of the study includes all the teachers of IIT Guwahati. At present there are 410 faculties in 11 departments are in IIT Guwahati

Sample of the study: Fifty (50) teachers were selected through simple random sampling procedure as sample of the study.

Tool and Techniques Used for Data Collection

In the present study the researcher has used self Developed tools to collect information on the Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers.

- 1). A checklist was developed by the researcher to collect the information about the status of Flipped classroom in IIT Guwahati.
- 2). A questionnaire was developed to reveal the perceptions of the teachers on advantages and disadvantages of flipped classroom

The researcher developed a questionnaire based on related literature and previous studies such as (Aljaraideh, Y. 2019; Newman et al., 2016; Afrilyasanti et al., 2016; Nouri, 2016 & Khanova, McLaughlin, Rhoney, Roth & Harris, 2015).The questionnaire was validated by a group of faculty members of department of education, Mizoram University. Their comments were incorporated for preparing the final version of questionnaire. The reliability of questionnaire was checked by distributing the questionnaire to 10 faculty members of IIT Guwahati outside of the sample of study. After two weeks, the questionnaire was distributed again. The Pearson correlation coefficient was (.72), which is highly reliable.

Procedure of Data Collection: The researcher took the permission from concern HODs of various departments for selection of teachers for the collection of data. Then researcher administered the questionnaire and collects the information from the teachers of various departments of IIT Guwahati. Then Researcher went to the each teacher's room then explains the purpose and procedure of the questionnaire and the questionnaire were supplied to the teachers and they were asked to fill the necessary entries like Name, sex, Qualifications, in the front page of the Questionnaire. The researcher told the teachers that set of questions formulated with the purpose of seeking their opinion with regard to the Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers. Each question is supplied with set of answers and you need to choose from the given choices the ones that apply to you or simply follow the instructions that will be given after each question. Your kind cooperation will be much esteemed. The

confidentially of your responses was guaranteed by the researcher. The research was administered successfully.

Procedure of Data Analysis

The pattern of analysis followed the requirements outlined in the statement of objectives and various research questions. Descriptive type of work was done to report the results of the Study on Flipped Classroom in IIT Guwahati: Status and Perceptions of Teachers. The teachers were mainly selected from the entire 11 department on Random Sampling techniques. And questionnaire was distributed to 50 teachers then according to their responses the percentage method was employed to analyze the following data.

Findings

1. It was found that in 11 departments of IIT Guwahati, all the departments have the adequate computers, LCD Projectors, White Screen, Camera and computer Lab. For Recording there is one common recording room for whole department in campus and separate Studio is available for Design Department. Also Wi-Fi is available in every department and in hostel.
2. The study reveals that 8% of computers are not used in IIT Guwahati and 12% several people share one computer in their classroom or department. Majority of the people 78% used one computer per person. And only 2% of computers are using two or more computer per person. Thus most of the people used one computer per person in IIT Guwahati.
3. The table shows that 48% of teacher introduced the content in form Pdf before classroom while teaching flipped classroom approach. And 32% share their content in Video to the students; only around 10% each share in form of audio and Microsoft Word.
4. In this study it was found that 60 % of teachers in IIT Guwahati are using flipped classroom approach and around 40% are not using Flipped Classroom Approach. Most of the teacher those who are using Flipped Classroom approach they had been using this approach since 2 years.
5. Majority of teachers Around 22% use Camtasia video editing software and some of teachers 14% use Adobe premiere pro and only 8% use Corel video, studio ultimate, Adobe premiere rush, then 6% use Final cut pro, Filmora, Obs Studio, Kinemaster, only 4% of teachers use Vimeo Create, Cyber Link Power Director, Adobe premiere elements, Shotcut, Openshot

Studio, KDENLIVE, very few teacher 2% use DaVinci Resolve Light works, VSDC, Hitfilm Express, Youtube Editor, Gihost,

6. It was found that, 88% teachers use MS Teams Application in IIT Guwahati most of the teacher prefer this Application for the online learning. And around 42% use Google meet frequently for the online classes then 28% use Google Classroom for conducting the classes online. And 22% of teachers in IIT Guwahati use Zoom Meeting, some of teachers 18% use Moodle app, ten percent (10%) use Udemy, eight (8%) use Virtual Classroom, six percent (6%) use Braincert, four percent (4%) use Blackboard Collaborate, Virtual Blackboard, Liveboard Interactive Whiteboard and 2% use Electa Live, Seesaw Class, Acadly. Therefore MS Team is the software found to be mostly used by teachers in IIT Guwahati to conduct their classes online and share the content for Flipped classroom Approach.

7. Based on result of this study it was found that 2% of teacher are Strongly Disagree that the flipped classroom gives greater opportunities to communicate with other students and six percent (6%) are Disagree with this statement and thirty eight (38%) are Neither Agree nor Disagree, Majority of the teacher 50% Agree that flipped classroom gives greater opportunities to communicate with other students in the classroom and around 4% is Strongly Agree with statement 1. Then 4% are Strongly Disagree with the statement 2, and around 10% are Disagree, thirty percent (30%) are Neither Agree nor Disagree, most of the teacher 44% are Agree that Absent Students benefit from a flipped classroom and only 12% is Strongly Agree with statement 2. Now The 6% are Strongly Disagree, four percent (4%) are Disagree, and 36% are Neither Agree nor Disagree, 46% are Agree with the statement that the flipped classroom is difficult for some students to access due to the additional technology required outside the classroom and 8% is Strongly Agree with statement 3. The 4% of teacher are Strongly Disagree that flipped classroom is difficult for some students to access due to the additional technology required outside the classroom, six percent (6%) are Disagree, forty percent (40%) are Neither Agree nor Disagree, and 38% are Agree and only 12% is Strongly Agree with this statement. The 2% are Strongly Disagree, four percent (4%) are Disagree, forty two (42%) are Neither Agree nor Disagree, fifty (50%) are Agree and 4% is Strongly Agree that Time created for in-class activities in the flipped classroom allows for more active learning and increased higher order thinking for students. Twelve percent (12%) are Disagree, then 52% are Neither Agree nor Disagree, around 28% are Agree and 8% is Strongly Agree that Student discipline issues

decrease in a flipped classroom. The 2% are Strongly Disagree, around 10% are Disagree, and 34% are Neither Agree nor Disagree, forty six (46%) most of the teacher are Agree that Students do not need the teacher present for direct instruction, but students need the teacher present for solving problems and 8% is Strongly Agree. And 8% are Disagree, twenty eight percent (28%) are Neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom removes passive learning from the classroom and 6% is Strongly Agree with statement 8. Around 8% are Disagree that the flipped classroom allows teachers more time to personalize instruction for students, and 34% are neither Agree nor Disagree, but 52% are Agree and 6% is Strongly Agree with statement 9. Around 6% are Strongly Disagree, only 2% are Disagree, majority of 68% teacher are in position that they are Neither Agree nor Disagree that students learn better in a flipped classroom, around 24% are also Agree with statement 10. The 2% are Strongly Disagree, only 6% are Disagree, 40% are Neither Agree nor Disagree, majority of teachers 48% are Agree that In flipped classroom students have a sense of responsibility for their learning and come prepared to class and few teachers 4% is Strongly Agree with statement 11. The 2% are Strongly Disagree, only some of teachers 4% are Disagree, around 30% are Neither Agree nor Disagree, majority 60% are Agree that flipped classroom allows students to develop better relationships with their peers through co-operation and collaboration and 4% is Strongly Agree with statement 12. The, 10% are Disagree, around 30% are neither Agree nor Disagree, majority of teachers 54% are Agree that flipped classroom allows teachers to have increased interaction with students and 6% is Strongly Agree with statement 13. Only few teachers 2% are Strongly Disagree, then around 6% is Disagree, thirty two (32%) are neither Agree nor Disagree, majority of teachers 58% are Agree that Flipping the classroom creates time for direct instruction, active learning activities, and content coverage and 2% is Strongly Agree with statement 14.

8. As an advantage Study reveals that according to the teachers of IIT Guwahati flipped classroom makes better understanding of the topic and as content are introduced before the classroom so students come prepared to the classroom. In flipped classroom during classroom time there is a more interaction and group discussion so students develop higher order thinking, problem solving capacity increases also more interaction among the students increase and they will be thinking independently. Also it is a student-centered so most of the activities are done by a student which creates curiosity of learning among the students in this approach. Readymade

videos can be used in this method so it helps in saving of teacher's time and covers the syllabus in less time. Contents are made available through online so contents are more accessible.

9. It was found that in this approach as a disadvantage according to the teacher of IIT Guwahati Students are not willing often as they do not prepare, and sometimes basic understanding of the students may go wrong, there is no timeline for executing each task or activity, Blackboard teaching has no alternatives. Students learn more while taking notes from board. This is a beat in soft teaching. Also, the complete set of question focuses on students. It should see the instructors' side. Teaching in classroom is very pleasant for instructor, and hence the quality of teaching is better. Increase digital divide among students, dealing with technical challenges become difficult. Some students faced problems with internet and technology some students unable to watch video due to lack of internets. Difficult to handle electronic devices floating assignment is one of the disadvantages faced by teachers. It cannot be implemented in every subject because not all content can be taught using this method. Teachers feel that it is not suitable for large size. Highly mathematical subjects are difficult to be carried out in flipped classroom approach. Due to use of more videos and online it makes more stress on eyes.

10. According to some of the teachers flipped classroom will be useful for other subjects and they suggest that it will be helpful in subjects where prior background is not required. Few subjects can use flipped classroom teaching. Introductory subjects and subjects with less theory component. May be practical based courses only. In principle it can be used for any subject other than those involves extensive mathematic exposition. Can be adopted for more advance subjects other than elementary courses. Will be useful for design courses where ample video content is available for pre-learning, but for other cases, the teacher has to dedicate a lot of time in developing content. Maybe it would be good for non-technical classroom. Flipped classroom is useful for other some subject but not applicable for all subjects.

11. Teachers of IIT Guwahati recommends that smaller class size improved implication and also suggest that there should be a cross questioning after the discussion. Flipped classroom should be occasional rather than regular. For discussion forming group of similar caliber students will be more effective. Recorded videos would be better then lives videos. Some teachers also say that it would be better if content can be introduced during classroom time. Better internet connectivity for everyone it would be great if each individual will have a brief summary of topic beforehand. That would make the teaching learning transaction very smooth. Some of the

Teachers in this institute are still experimenting Flipped classroom so they cannot suggest. There must be a timeline for executing each task or activity

12. Flipped classroom help both teacher and student in learning and growing together. Excellent initiative but it should be implemented while teaching care of all factors such as how to conduct exams effectively without cheating. It will be successful with bright and responsible students. India students are used to be spoon feeding hence, it may not work here. Success of teaching learning depends on the instructors and faculty. Some teacher also says that Physical classroom teaching is always better. Students, parents and teacher have equal responsibilities to make flipped classroom a success.

Educational Implications

The study has emerged many educational implications for the policy makers, teachers, teacher educators and students. The perceptions from the teachers of IIT Guwahati will help in quality improvement of teaching learning process by adopting Flipped classroom approach. It will empower students participation in the classroom from the flipped classroom approach students can learn lessons through videos. The central government should take care about the perception of teachers of various departments of IIT Guwahati about the advantages of flipped classroom and should promote flipped classroom approach in other IITs, NITs, Technical Institutions, and Central Universities. The teachers of various departments should look to the disadvantages of flipped classroom and make a strategy to overcome these disadvantages.

The central government organized faculty development programme for teachers of different IITs, NITs, and Central Universities to train about flipped classroom approach. The findings of the study will help the researcher to conduct similar studies in different institutions.

Suggestions for Further studies

1. Similar studies may be conducted from larger sample for better autenticity and to validate the present findings.
2. The perceptions of other stakeholders like students, adminstratus, and other authorities may be studied
3. A comparative study of the status and implementation of flipped classroom of IIT and NIT may be carried out.

4. An analytical study may be conducted on flipped classroom in Central Universities of North-East India
5. An Experimental study may be conducted to find out the effectiveness of flipped classroom on academic achievement.

Conclusion The purpose of this study was to discover teachers' perceptions of using the flipped classroom rather than a more traditional instructional method. Based on the present study, it is concluded that flipped classroom is a recent innovation in the field of education and IIT Guwahati is using this approach since 2015. So, the result of this study was found to be effective and infrastructure facilities are available in IIT Guwahati. In Present, this institution did not implement Flipped classroom Approach fully in all the departments. Flipped classroom itself has so many advantages but on the other hand disadvantages too. However, it is suggested that perceptions of students also should be studied to make clearer about the advantages and disadvantages on flipped classroom.