

# ICT based Inclusive Flipped Classroom to Better Integrate Interdisciplinary Research

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## ABSTRACT

With the development of Industry 4.0, inclusive education system has been challenged in view of effectiveness of dealing with faculty student interaction. It is hard to get aligned with the challenges like communication, implementation and reviewing in interdisciplinary research based projects. Our goal is to inculcate interdisciplinary research based approach using ICT in engineering students through flipped classroom which consists of in class and out of class design activities. This paper focuses on in class activity of students through Peer Instructions (PI) and Think Pair and Share (TPS) strategy by teacher for development of mechatronics application in Home, Factory and Business. The flipped classroom activities make the students as self directed learners for multidisciplinary projects.

## 1. Introduction

Internet of Things is a new era of ubiquity where humans are in minority who uses the internet compared to over 12.5 billion of things [1] are connected to the internet as of now. Advancement in ICT leads to the use of virtual reality with telepresence [2] helps the students to feel as if he is in class activity. Such type of system can be very valuable only for students with disabilities using remotely controlled robot which is in the classroom attending lectures. Previous approaches have used smart phone, Internet based approaches for ICT, but in some rural areas these things may not be available. This encourages us to present innovative flipped classroom activity which consists of offline videos to cover out-of-class activity and PI and TPS for in-class activities.

Over 20 billion of things [1] to be connected to the internet are projected to cross in near future, which is more challenging to engineering students for development of multidisciplinary projects. Wireless IoT driven solutions bring educational institutes to Students rather than bring Students to Educational Institutes. To cope up with this flipped classroom enables students to spend more time in collaborating with one another and liberating for slow learners.

## 2. Methodology

The Flipped classroom is an innovative teaching model used for enhancing engagement of students in class, efficient use of class time with teamwork to develop interdisciplinary approach which leads to increase in accountability of students for self learning. MOODLE is a Learning Management System is used efficiently for Flipped classroom where students can enroll into the various courses created by a teacher. These various courses along with video lectures and course material uploaded by teacher are accessible to the students so it will be helpful for them to complete out-of-class activity.

It is more challenging for a teacher to create an instructional videos and material for flipped class but once created it is accessible to enrolled students for all course modules created by teacher. During in-class activity for peer instructions teacher will show the videos using projector created for other course module at remember and understand level of bloom's taxonomy and saves time compared to conventional chalk board method. After the end of video, learning outcome of students will be taken using quiz at apply level of bloom's taxonomy on MOODLE. The Students will use smart phone for quiz on learning outcome. This will enhance engagement of students using MOODLE. Fig 1 shows correlation between Flipped classroom activity through MOODLE and bloom's taxonomy.

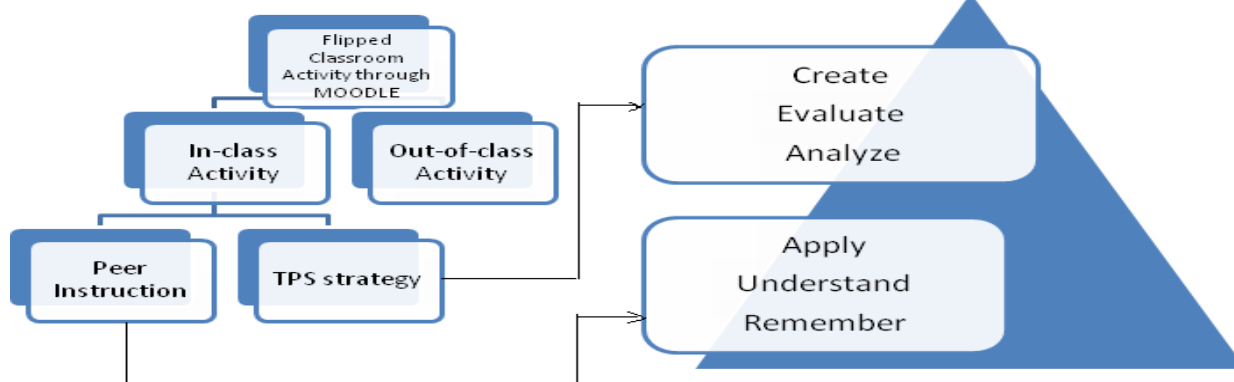


Fig. 1 Correlation between Flipped classroom activity through MOODLE and bloom's taxonomy

During TPS strategy, teachers need to be sensitive to the wide variety of needs amongst students for interdisciplinary research. Students will work together in team for TPS activity and during think phase students will solve puzzles individually on MOODLE and evaluated online. In pair phase students have opportunities to elaborate on ideas through talk in a team. Teacher asks students to share their group idea in front of class which improves leadership and communication skill of students. TPS strategy is implemented at analyze, evaluate and create level of bloom's taxonomy. Thus, TPS activity in overall helps in improving the socio-economic culture in classroom for interdisciplinary projects.

### 3. results and discussion

Students are required to go beyond mere listening and construction of prescribed problem statement. They are

required to think deeply about the various elements they were familiarized in out-of-class and do higher order thinking.

### 4. Conclusions

Using instructor feedback summary design of problem statement has been improved for interdisciplinary research through inclusive flipped classroom. It is a time consuming and tedious activity for teachers as well as students. Screencast studio has been effectively used by teachers to create videos and by adding ICT based activities on MOODLE student's time has been saved. In future, this MOODLE can be used as MOOC's platform and Smart mirror using IoT for active learners.

### References

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