EduPaL:
Enabling Blended Learning in Resource Constrained Environments

Malolan Chetlur	IBM Research India
Ashay Tamhane	Myntra India
Vinay Kumar Reddy	IBM Research India
Bikram Sengupta	IBM Research India
Mohit Jain	IBM Research India
Pongsakorn Sukjunnimit	University of Southern California
Ramrao Wagh	University of Goa India

Problem

Technology-enabled education transformation underway in the developed world

- Blended Learning, Flipped Classrooms being adopted by teachers

Education in developing regions continues to be plagued by basic infrastructure problems

- Lack of adequate IT infrastructure
- Intermittent internet connectivity or no connectivity at home
- Many students do not even own laptops/computers at home; cost is an important issue

Ubiquitous learning for all is a distant dream for the developing regions

- Infrastructure constraints pose major challenges for flipped classrooms

Motivation

To increase access to quality digital content in developing regions like India within the prevailing educational delivery models

Solution to be sensitive to ground realities

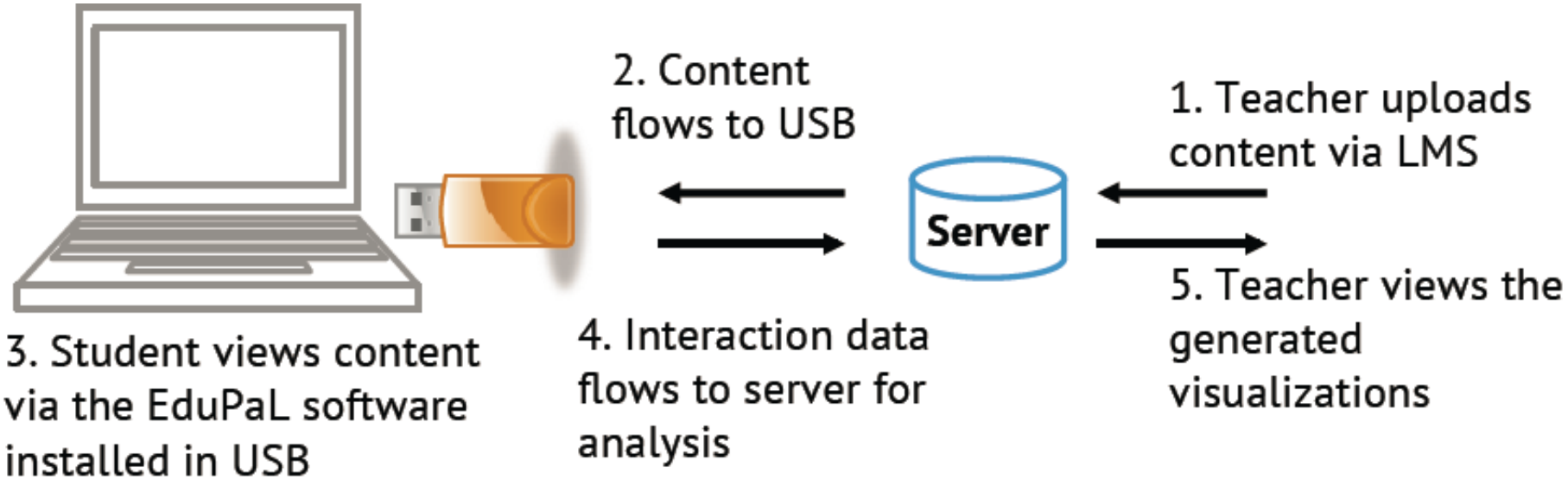
- intermittent internet connectivity
- less or no set up cost to the students
- Ease of use with less or no complex installations

Solution catering to teacher's requirements

- Ability to track students' learning and measure engagement
- Keeping teachers in the learning loop

Need for low-cost applications to support flipped classrooms and blended learning

EduPaL System



*LMS: Learning Management System

Learning Activity Monitoring

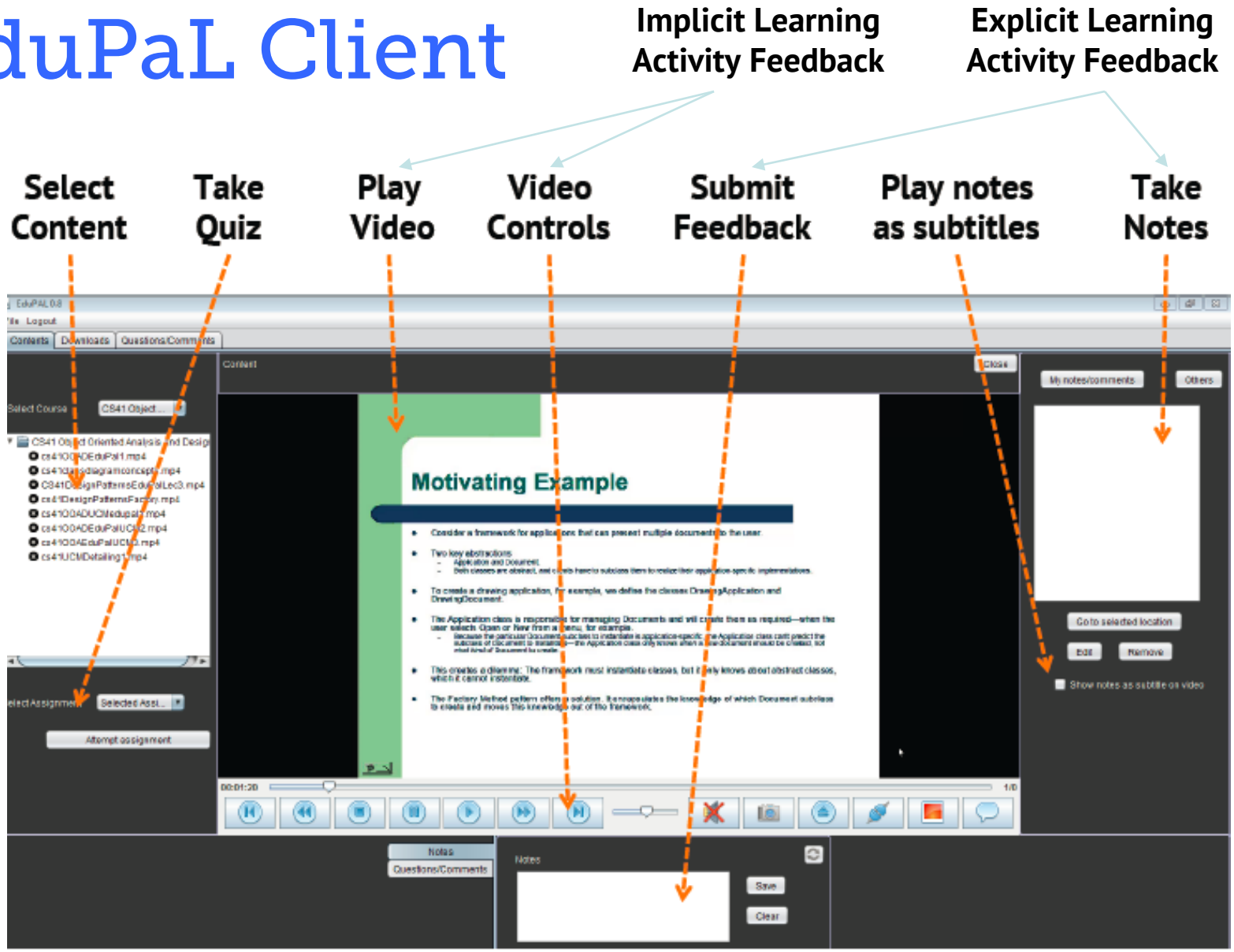
EduPaL captures fine-grained events

- **Implicit Events**:
  - Play, pause, rewind, etc. (video events)
  - Page up, page down (document events)
- **Explicit Events**: Feedback, Questions, Comments, etc.

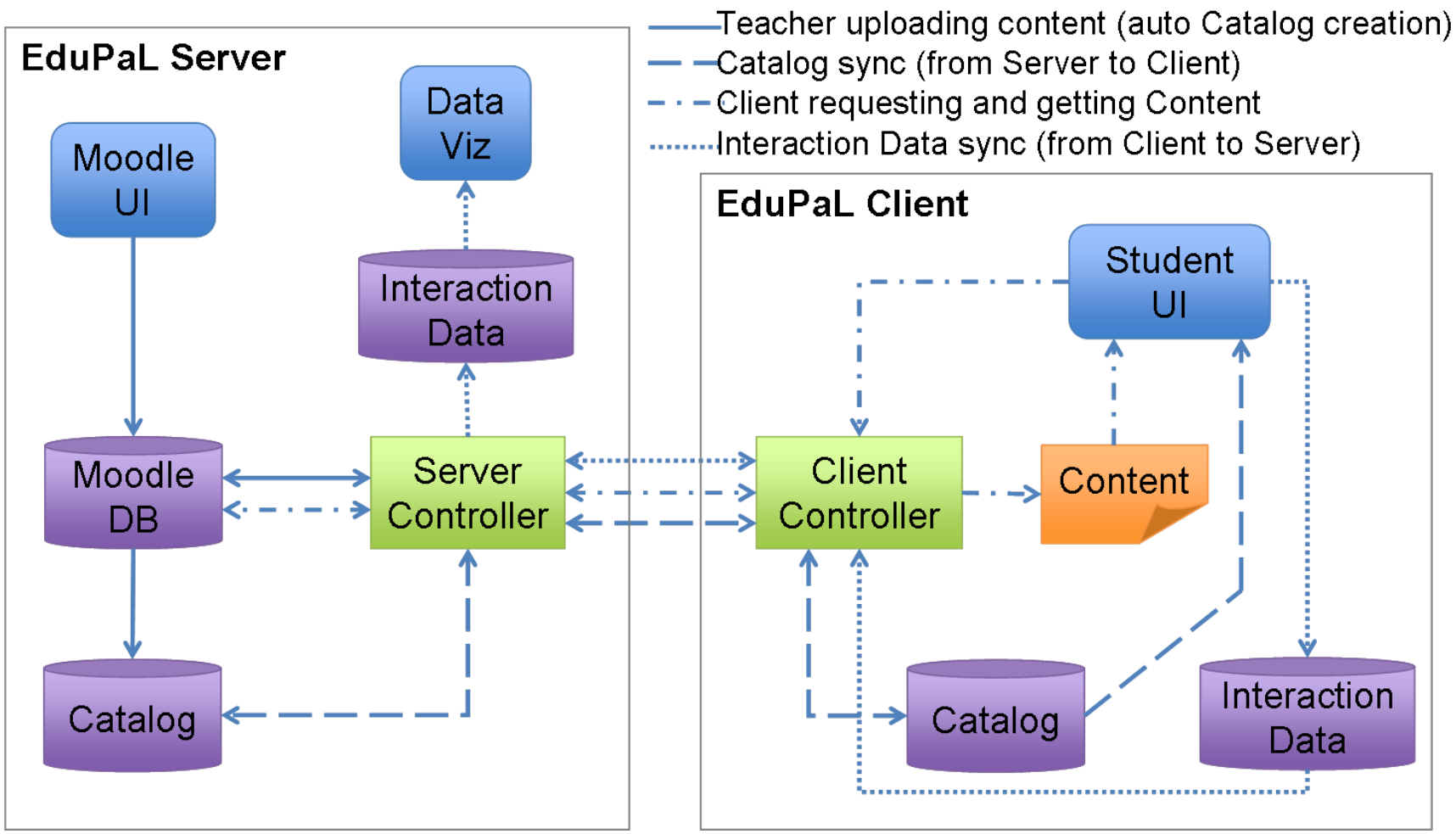
Student Engagement Metrics from the captured data

- **Completion Index** : Percentage of Video or document viewed
- **Interaction Index**: Number of questions, or comments or notes added by student while viewing the lecture

EduPaL Client



EduPaL Data Delivery



EduPaL Study

Goal

- Explore EduPaL in low infrastructure and intermittent connectivity scenarios
- Capturing student's engagement and its utility to teachers

4 month long semester Object Oriented Analysis & Design Course (Mid-December 2013 to Mid-April 2014)

Fourth-Semester Masters of Computer Application (MCA) Course

- Two weekly lectures on Tuesdays and Thursdays (9-11)
- One OOAD lab session in a week
- Tuesday lectures with EduPaL
- Thursday lectures without EduPaL
- Students and teacher submitted feedback at the end of every lecture

EduPaL Study (Contd)

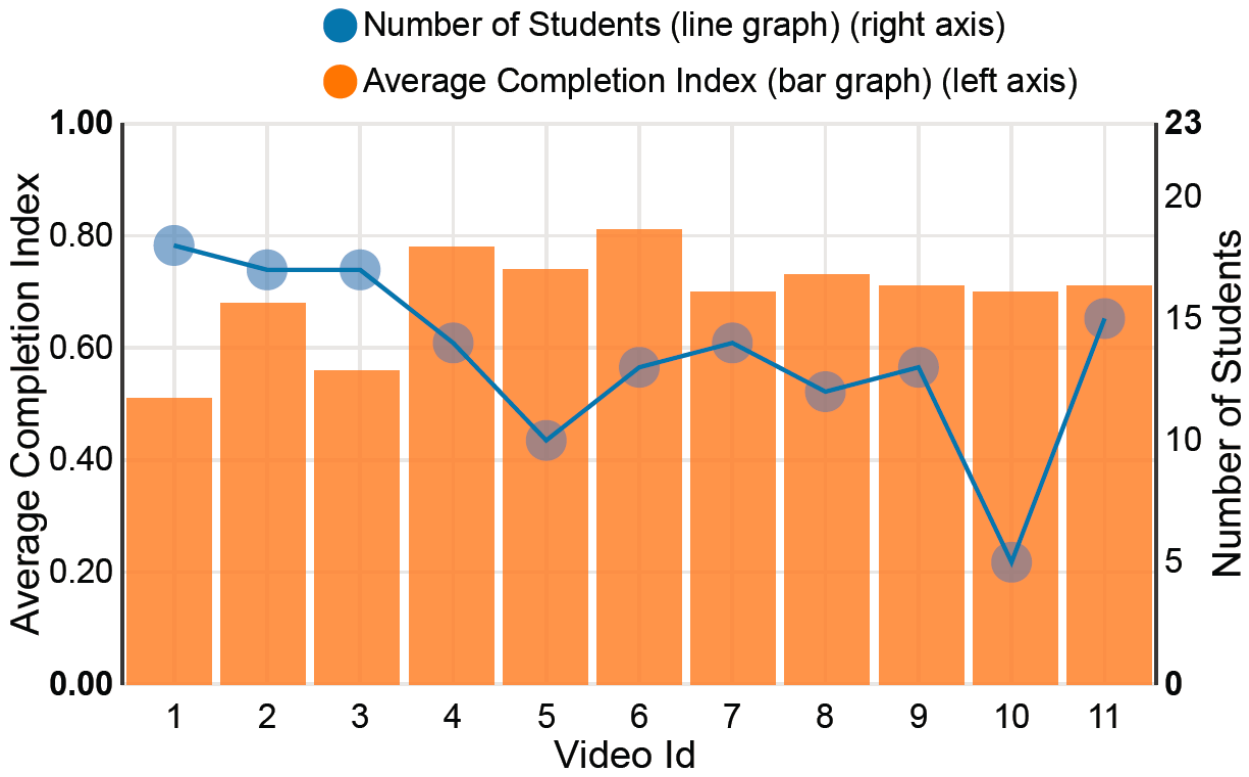
30 Students

- 7-Female, 23-Male
- 18 Hostellers, 12 Day Scholars
- Family Income between Rs. 0.5Lakhs – Rs. 1.5Lakhs
- Student's Internet Facility
  - 13 – No internet, 8 – Intermittent access, 9 – Internet access all times

1 Male Teacher

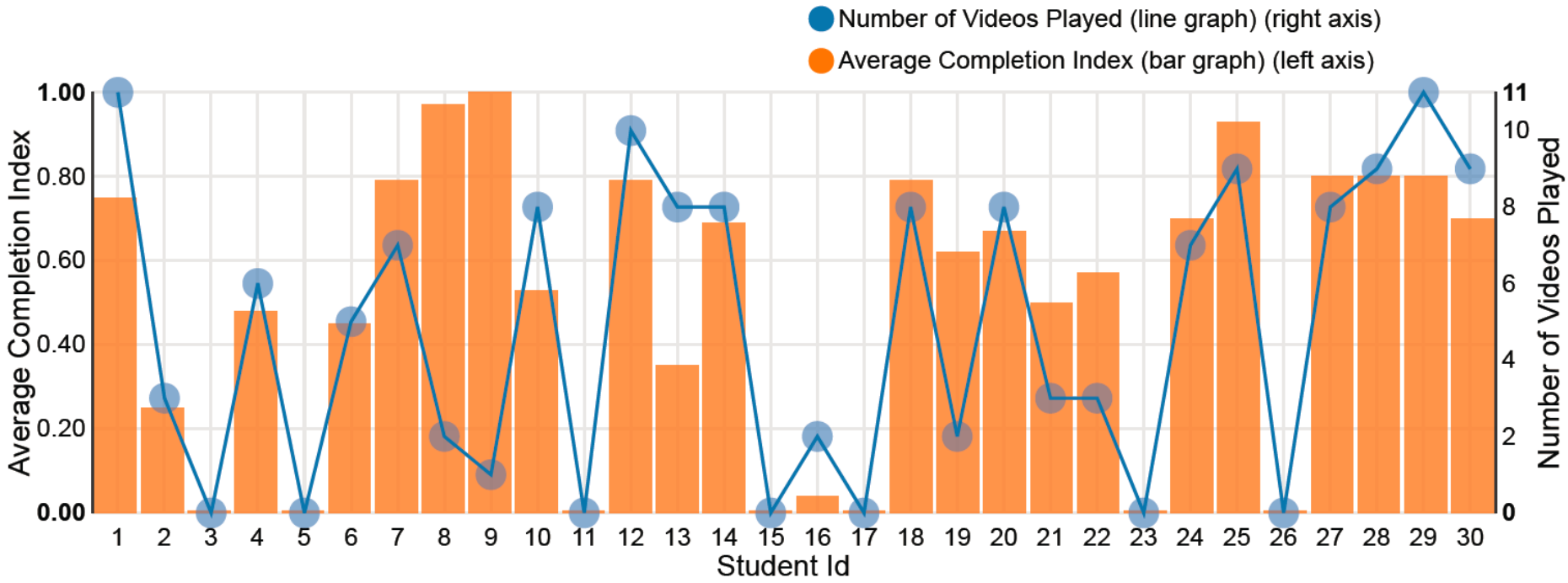
- Teaching Experience of 24 years
- Master's Degree in Computer Science
- ~6hrs on Computer and ~3hrs on internet
- Uses IT tools and Apps heavily for teaching
  - Moodle, Google Drive, Facebook, YouTube, etc.
- Creates own lecture content (slides and voice-over Videos)

Avg Completion Index (Video)



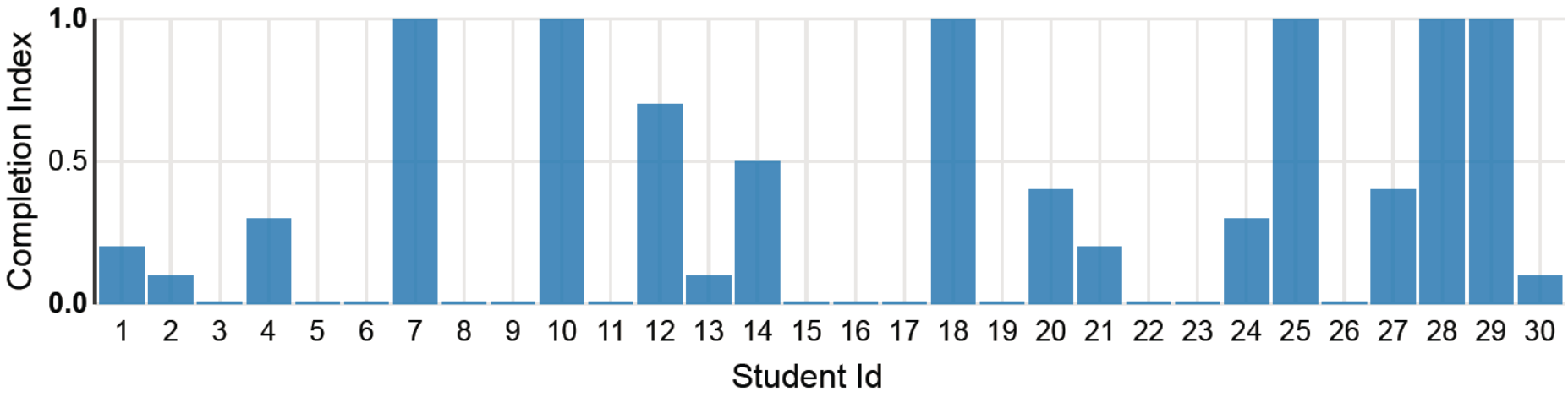
Number of students watched a particular video along with its Completion Index shows the **overall engagement** in a particular video lecture

Avg Completion Index (all videos)



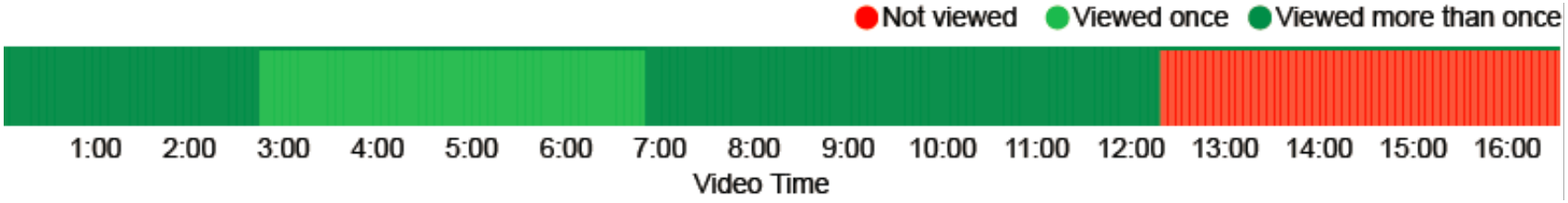
Average Completion Index of all played videos = 0.69

Completion Index for Video Id 3



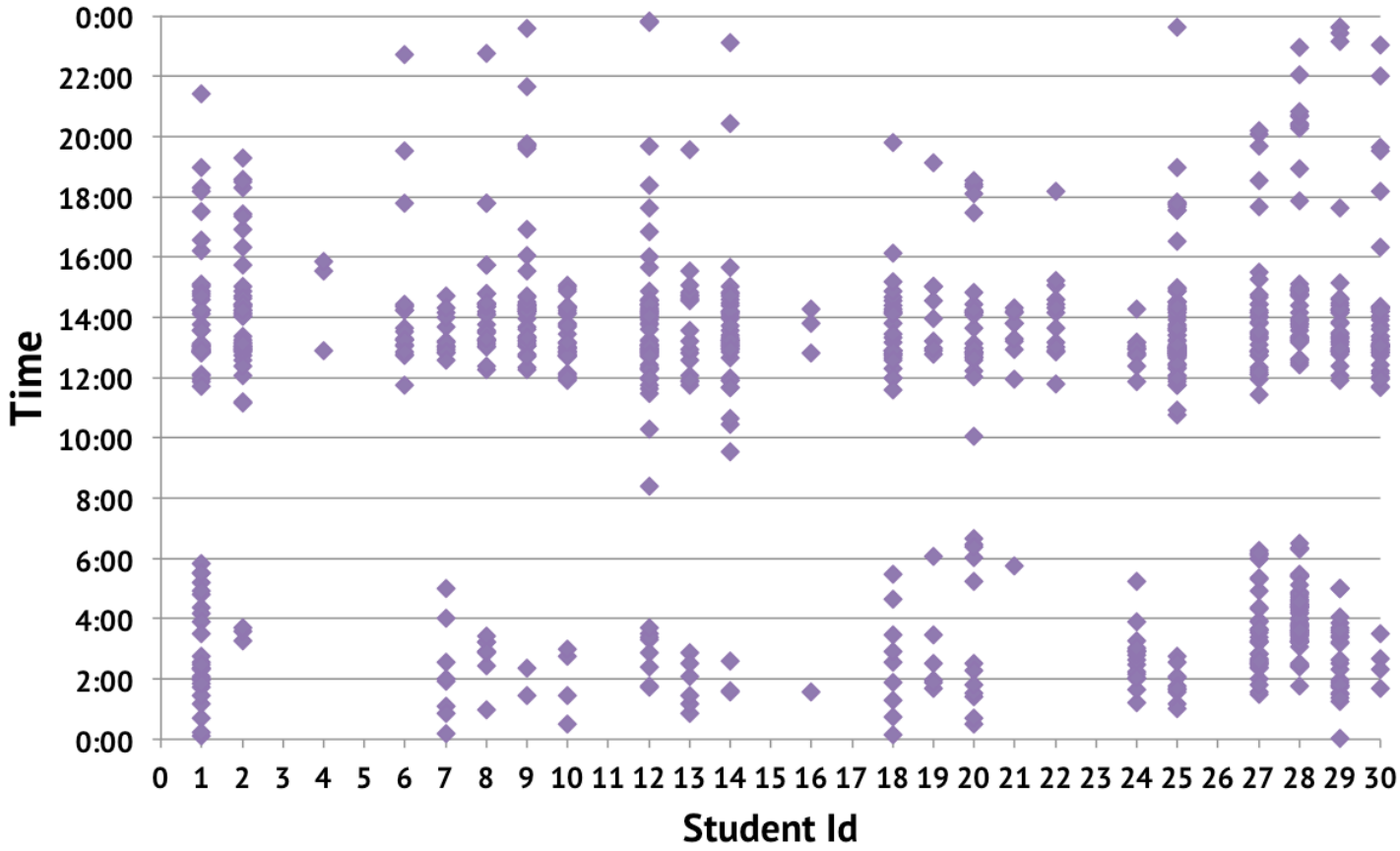
Based on Completion Index of a video, teacher can **tailor in-class lecture**

Viewing Details for Video Id 3



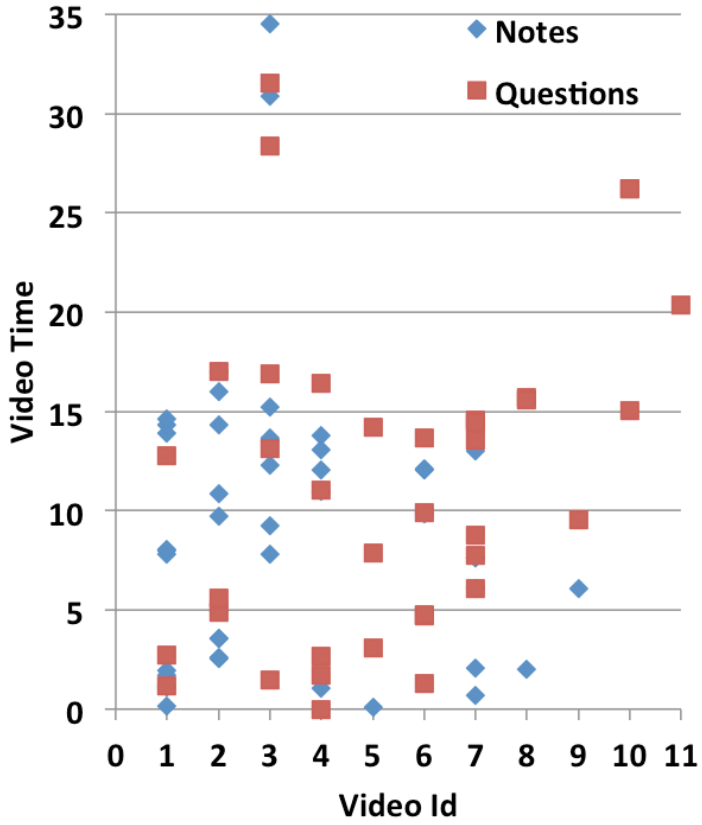
Based on Video Viewing details of a student, teacher can **tailor learning activities for the student**

Time of Usage by Students



Students liked the **Anytime, Anywhere lecture access**; EduPaL usage hours both in the day and night

Questions and Notes wrt Video



Many students liked the **Question and Notes Feature**; but few students used them frequently

Learning from EduPaL Study

Teacher appreciated the ability to control the classroom and tools flexibility

- Answer student's questions and clarify doubts
- Effective tool for the teacher to flip the classroom
- Visualizations tracking student engagement and learning activity completion

Learning from EduPaL Study

Student Performance

- Students performed significantly well in questions from EduPaL sessions (in end-semester subjective exam)
- No significant improvement seen in end-semester objective exam
  - Students took less time to complete questions from EduPaL sessions

Learning from EduPaL Study

Educational Video Creation

- Daunting task for teachers
- Students preferred custom content (based on feedback at the end of pilot)
- Implicit Feedback data showed higher drop-out in the middle of longer lecture videos
  - Teacher started creating shorter lecture videos

Summary

Measuring Student Engagement is useful for teachers

Fine-Grained learning event capture gives implicit feedback to teachers

Implicit and Explicit feedback useful to tailor class by teachers

EduPaL tool seems to improve class performance based on the limited data obtained (needs further study)

Thank You!

Malolan Chetlur **mchetlur@in.ibm.com**	IBM Research India
Ashay Tamhane	Myntra India
Vinay Kumar Reddy	IBM Research India
Bikram Sengupta	IBM Research India
Mohit Jain	IBM Research India
Pongsakorn Sukjunnimit	University of Southern California
Ramrao Wagh	University of Goa India