FLIPPING THE CLASSROOM: AN INVESTIGATION INTO THE USE OF PRE-RECORDED VIDEO LECTURES AND THE IMPACT ON STUDENT AND INSTRUCTOR EXPERIENCE IN TWO FIRST-YEAR CALCULUS COURSES

Inquiry questions
1. To what extent do students use the recorded lectures?
2. What are students’ perceptions of the usability of the video lectures and their value for learning?
3. What is the impact of the video lectures on the pedagogical practice of the instructors?

Context
What is a flipped classroom? For a flipped classroom, students are required to watch pre-recorded lectures and learn the materials before coming to class. In class, they review and assimilate the materials through clicker questions, peer-instruction and just-in-time teaching.

Courses investigated
Two first-year service calculus courses offered in fall 2012: • Math 150 – Calculus I with Review (enrollment = 220) • Math 152 – Calculus I (enrollment = 246)

In total 16 flipped classes were conducted in the two courses (eight classes each).

Instructors
Both instructors were senior lecturers and SFU Teaching Excellence Award recipients. They both had taught the courses many times before. They produced all the video lectures used in the flipped classrooms.

Student demographics
Based on the data collected from the mid-term survey, a typical respondent from Math 150 is a 1st-year full-time science major male who takes 4 courses in the same semester. A typical respondent from Math 152 is a 2nd-year full-time science or applied sciences major male who takes four courses in the same semester.

Methodology
The study collected both quantitative and qualitative data using the following methods:
• Survey 1 (mid-term survey) • Math 150: 91 respondents with a response rate of 41% • Math 152: 83 respondent with a response rate of 37% • Survey 2 (end-of-semester survey) • Math 150: 68 respondent with a response rate of 31% • Math 152: 71 respondent with a response rate of 29%

Results and conclusions
Q 1. To what extent do students use the recorded lectures?

Weekly viewing time based on Survey 1 and Survey 2

Math 150 respondents appear to have spent less time watching the video over the semester.

Viewing behaviour before, during and after class

A summary of the lecture viewing behaviour before, during, and after class based on Survey one.

Q 2. What are the students’ perceptions of the usability of the video lectures and their value for learning?

Usage
Most of the respondents from both courses considered the videos easy to navigate and their instructions clear. They also thought the videos’ length was about right (each video was approximately 40 minutes long, consisting of a number of 5-10 minute segments). However, a number of respondents from both courses also complained that the videos were too long.

Values for learning
When asked to “List the top three things you liked about the video lectures,” respondents from both courses listed a wide range of features and affordances about convenience, learning and instruction values, content, style, and organization.

Respondents from both courses considered the following to be the top features of the video lectures:
• Being able to learn at one’s own pace

Q 3. What is the impact of the video lectures on instructors’ pedagogical practice?

• Producing the video lectures took a significant amount of time. It needs training and support.
• Instead of preparing content for lectures, instructors prepared problems for students to solve in class.
• In class, instead of instructor asking questions and students answering, students asked questions and the instructor answered.
• Instructors and students interacted in the classroom much more.
• Instructors’ relationship with the classroom space changed: instead of standing in front of the classroom, they went up and down the stairs, walked in between the rows and talked to students at their desks.
• “This makes teaching fun again!”
• “Will I flip the classroom again? Absolutely.”

References