

Flipping the Classroom: Investigation of Student and Instructor Experiences in First Year Calculus

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Teaching and Learning Development Grants:

Flipping the Classroom: An Investigation of Student and Instructor Experience in Two First-Year Calculus Courses and Its Impact on Learning

Flipping the Classroom: An investigation of the use of pre-recorded video lectures and its impact on student and instructor experience in two first-year calculus courses

Flipped Classroom

“The classroom flip (or inverted classroom) moves the lecture outside the classroom via technology and moves homework and practice with concepts inside the classroom via learning activities.”

Dr. Jeremy Strayer

The Facts

course	title	enrollment	instructor	# flipped classes
Math 150	Calculus I: Differential Calculus with Review	220	Jungic	8
Math 151	Calculus I: Differential Calculus	342	Mulholland	9
Math 152	Calculus II: Integral Calculus	246	Mulholland	8

Our script:

- Phase 1: **information gathering** - students watch the video lecture, or read the textbook
- Phase 2: **preliminary assessment** - students do the online quiz (due the evening before the flipped class)
- Phase 3: **make sense of information** - in class, students work through problems individually and in groups (clickers, peer instruction, just-in-time teaching)
- Phase 4: at home students continue to make sense of information by working through questions on the weekly homework assignment

Video Demo

2.7 Derivatives and Rates of Change

1. **Quote.** "The real voyage of discovery consists not in seeking new landscapes, but in having new eyes."

(Marcel Proust , French author, 1871- 1922)

2. **Definition.** The **tangent line** to the curve $y = f(x)$ at the point $P(a, f(a))$ is the line through P with slope

$$m = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

provided that this limit exists.



Post Video Questions

Question 1

1 pts

If $\lim_{x \rightarrow a} f(x) = 0$ and $\lim_{x \rightarrow a} g(x)$ does not exist then $\lim_{x \rightarrow a} f(x)g(x)$

- (A) is 1
- (B) is 0
- (C) is ∞
- (D) does not exist (and isn't ∞)
- (E) not enough information is given

A

B

C

D

E

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C



D



E

Inside the classroom

The image shows a presentation slide titled "Newton's Method" displayed on a screen. The slide content includes:

- A title "Newton's Method" written in blue cursive.
- A boxed equation:
$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$
- A text block: "If the numbers x_n become closer and closer to r as n becomes large, then we say that sequence *converges* to r and we write
- A limit equation:
$$\lim_{n \rightarrow \infty} x_n = r$$

The presentation software interface is visible, showing a menu bar (Curio, File, Edit, View, Insert, Format, Arrange, Organizer, Window, Help) and a sidebar with a list of slides including "Newton's Method", "Untitled", and "Question 1" through "Question 7". A small red box with the number "2" is located to the left of the boxed equation.

Math 151 Fall 2013

Student's Comment

“I also loved your usage of the flipped classroom learning style. I thought it was extremely conducive to learning the material. I had heard of it before this course, but I had never experienced it, and the way it was set up I thought it greatly enhanced the lessons. “

Thank You!

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Want to join us in learning more?

The Flipped Classroom Seminar: What is out there and why?
Wednesdays (biweekly), 1:30-2:20

Contact Cindy Xin (cxin@sfu.ca) for more information