Experiences and Challenges Implementing Active Learning Techniques

Leilah McCarthy
City College of San Francisco
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Background/Motivation

UC Davis

- Taught PER-based discussion/laboratory sections in grad school

City College of San Francisco

- Traditional lecture-based environment
  - Stadium seating, large classes
  - Verification labs with heavy emphasis on error analysis
- Courses taught
  - Calc-based mechanics
  - "Preparatory Physics"

Background/Motivation

Implemented

- Clickers
- Discourse Management

To Be Implemented

- Microcomputer Based Labs (MBL)…dept purchasing new equipment

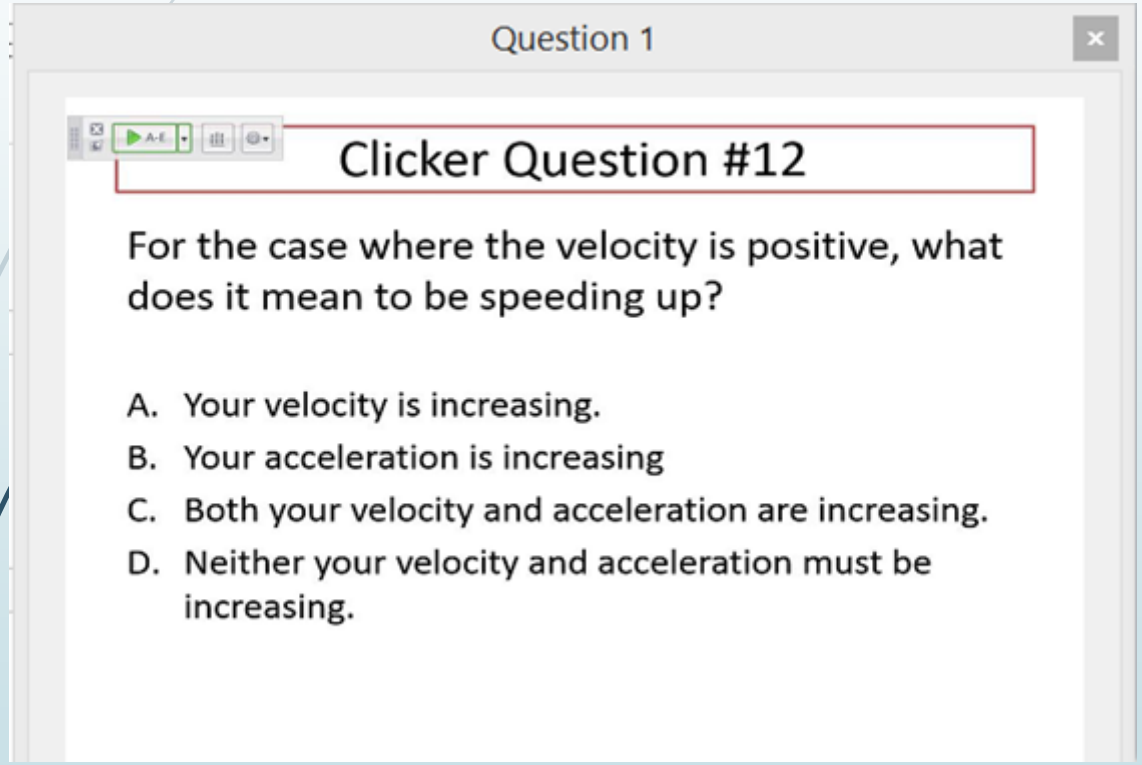
Not Implemented

- Studio format

Clickers

- Need to sell the benefits of using clickers
- Lecture attendance increased from 50-60% to 75-85%
  - Assigned participation points for answering questions
- Avg 3.8 questions per 50 min lecture
- No such thing as an easy question
  - Out of 544 questions, only once did 100% answer correctly

Clickers: Examples



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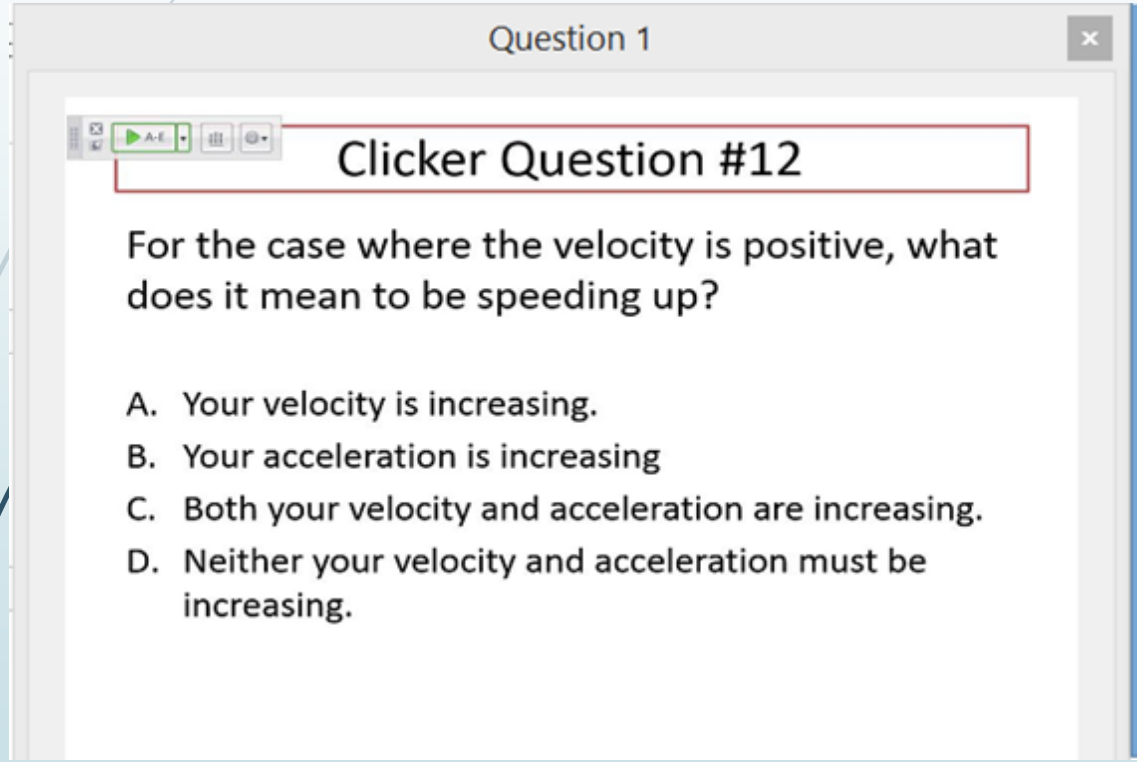

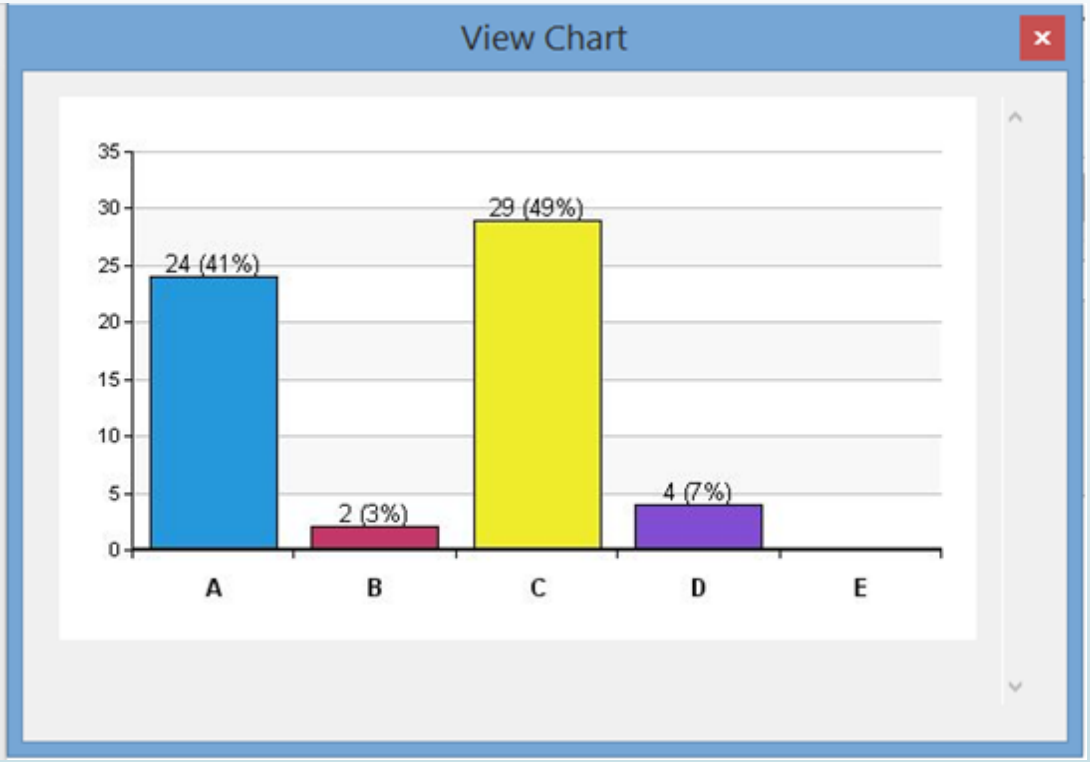

Clickers: Examples

Question 4

Clicker Question #6

Is the magnitude of the force of gravity greater on a falling elephant or a falling feather?

A. Elephant
B. Feather
C. Neither, gravity is the same for both.
D. It depends how fast they're going.

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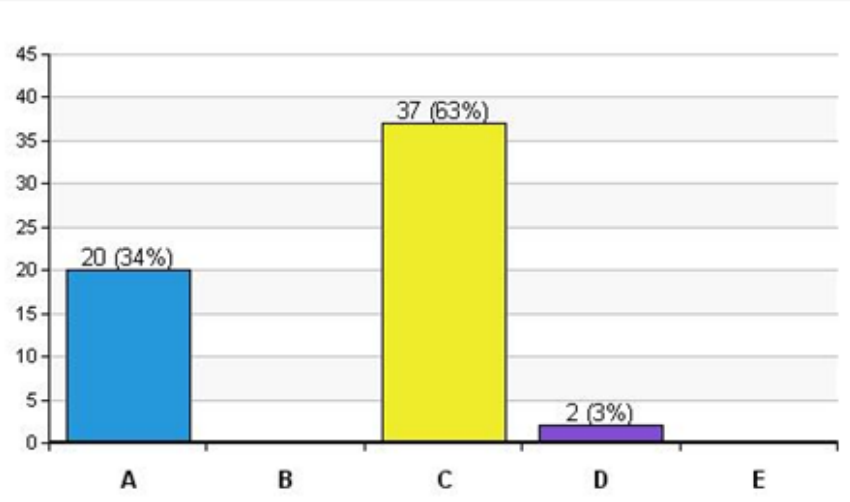


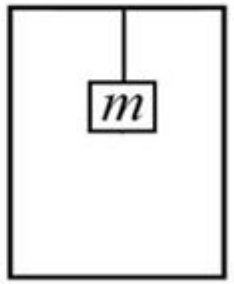
Clickers: Examples

Question 3

Clicker Question #9

A block of mass *m* hangs from by a rope from the ceiling of an elevator. If the elevator is moving upward and slowing down, what is the tension in the rope?

A. $T = mg$
B. $T < mg$
C. $T > mg$



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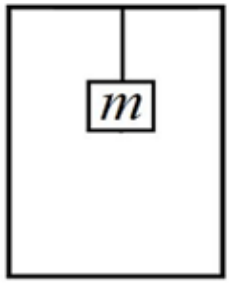

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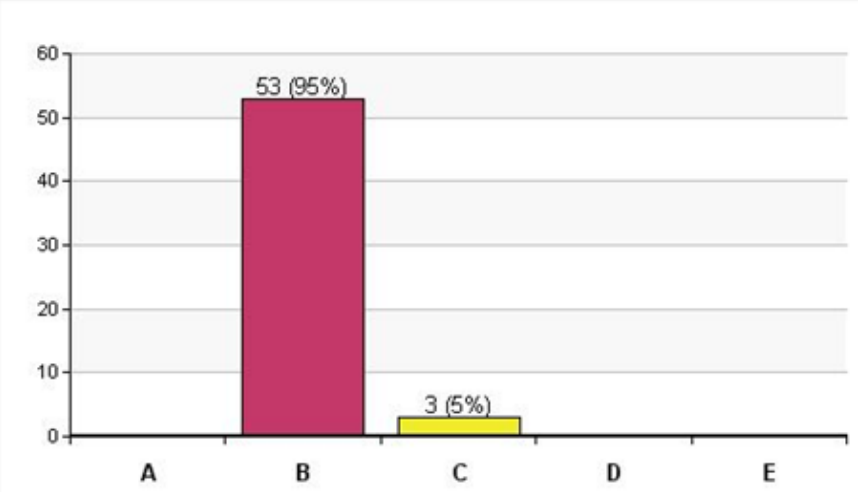
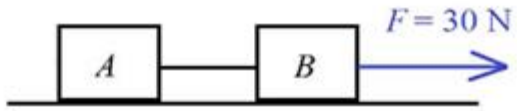


Clickers: Examples

Question 4

Clicker Question #10

Two blocks, A and B, are connected by a rope and are on a horizontal, frictionless surface (think air hockey table). Block B is pulled to the right by a force of 30 N. What is the tension in the rope connecting the two blocks?



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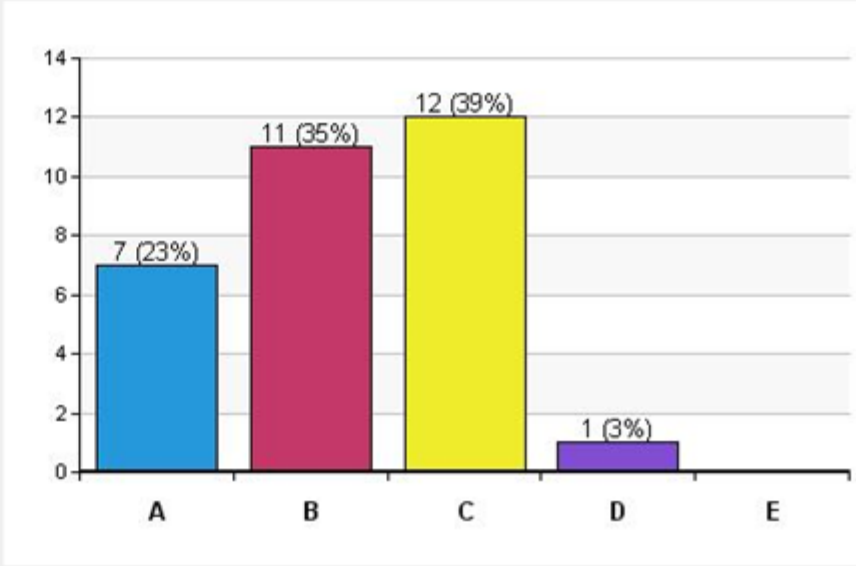
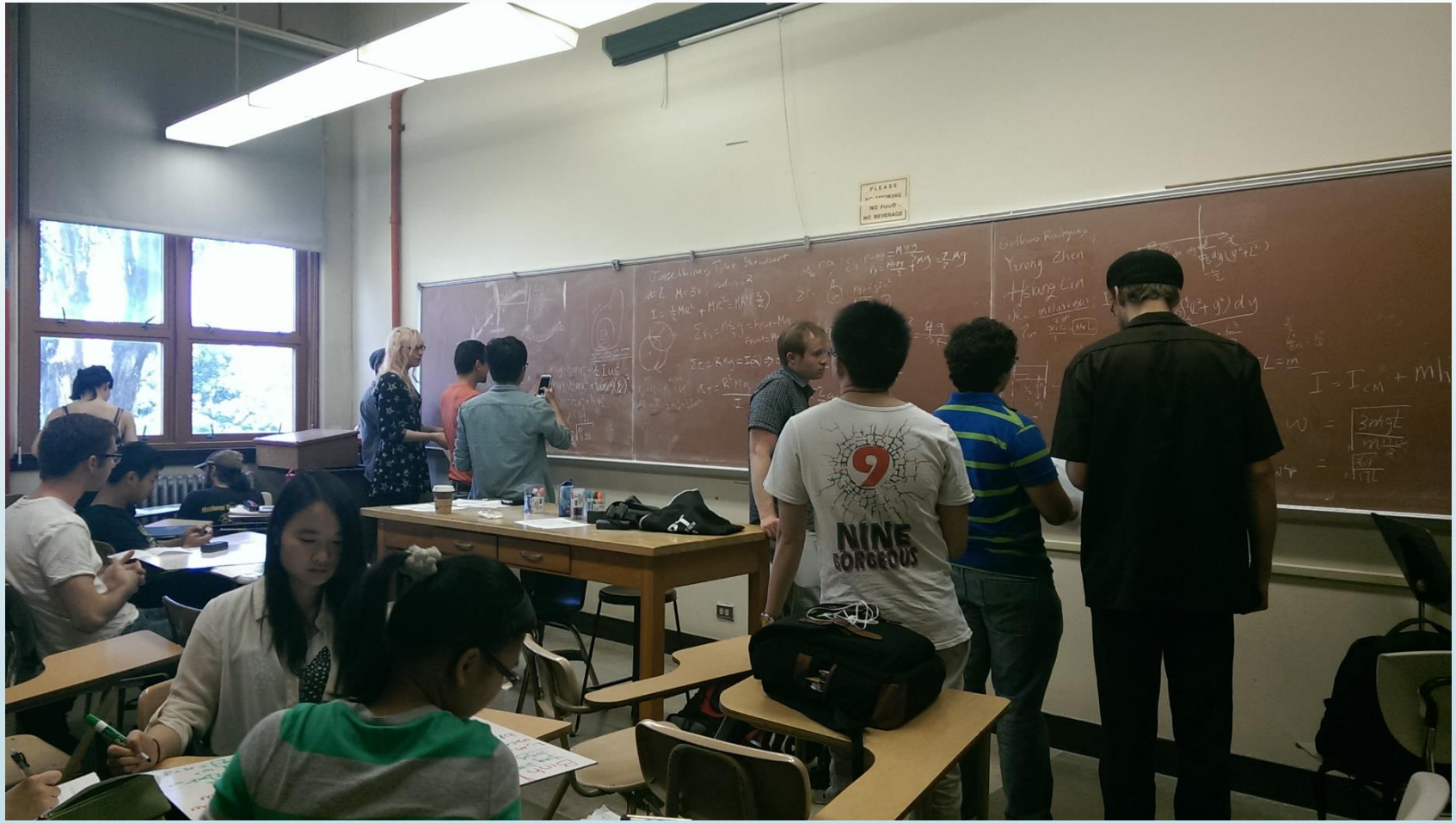


Discourse Management

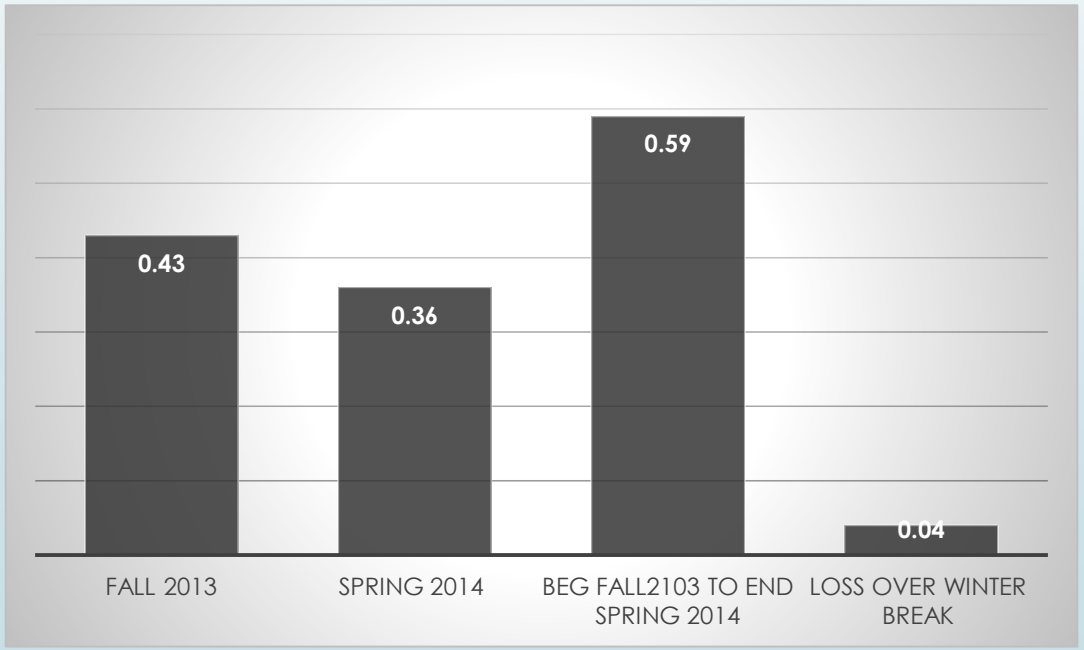
- Used during discussion section once per week
- Small whiteboards allowed everyone to be involved.
- Difficult with class sizes of 30-40

Discourse Management



FCI Results

- 0.36 -0.42 normalized gain
- 12 students followed me from Fall 2013 to Spring 2014



Challenges

- Requesting administrative changes
- Convincing other faculty to change labs

But overall VERY POSITIVE experience!