How to Use Lecture Capture Software for "Flipping" in Physics Lectures and for Outreach

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Polls:

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Who sometimes teaches by

- writing on board?
- projector to show slides (powerpoint, etc.)

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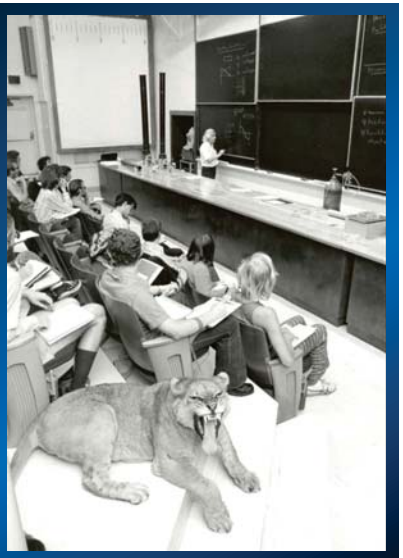
Who sometimes feels *there's too much material to cover to allow:*

- enough examples
- enough review
- a lot of discussion

Traditional lecture



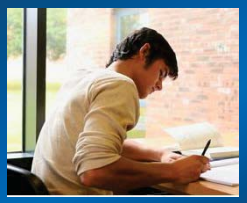
Prof. Ricardo Gomez, Caltech, 1975

Flipping – what is it?

traditional

Before class

During class



After class

Flipping – what is it?

flipped

Before class

During class

After class

Flipping – what is it?

Before class

During class

After class

Two questions instructors ask about flipping:

What is it?

- short videos replace lectures
- class time used instead for discussion, examples, demonstrations

Doesn't it take a lot of time?

for easy migration, use what's familiar:

- your old handwritten notes or slides
- the same classroom
- ICON

it's ok to start with *partial* flipping

There are many ways to do flipping

I will describe only one approach:

- Not a radical change in teaching

  so it's sure to work
- Not an intense time-pressured experience for students

  so they're happy

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The videos themselves are important,

but the main impact is from the increased discussion & examples

Example flip videos

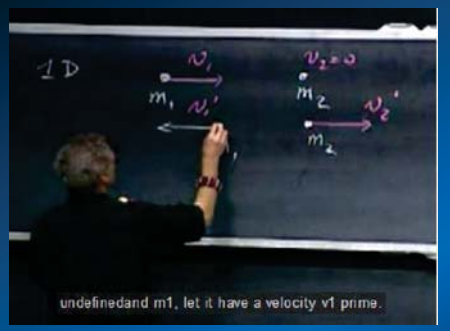
Approach #1: flip video using pdf handwritten notes

Approach #2: flip video using powerpoint

Approach #3: Whiteboard screencast
(requires tablet device)

credit: khanacademy.org

Compare to a video capture of a traditional lecture



Prof. Walter Levin, MIT OpenCourseWare

Problems that flipping solves

What to do during class?

With flipping, you have more time. What to do with it?

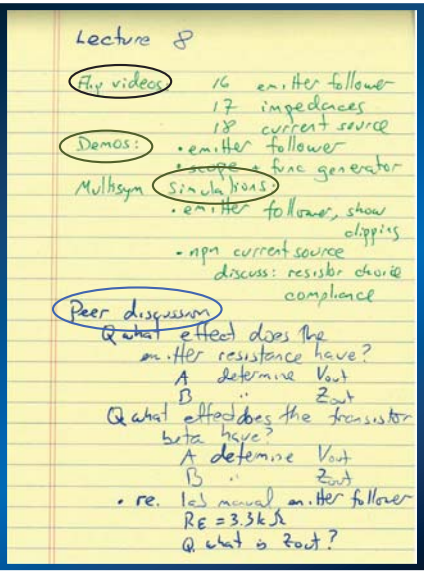
Examples & discussion:

- Problem solving
- Demonstrations or simulations
- Peer instruction

An activity agenda, instead of lecture notes

Agenda that I followed in a 75 minute class

(first page)



Outline

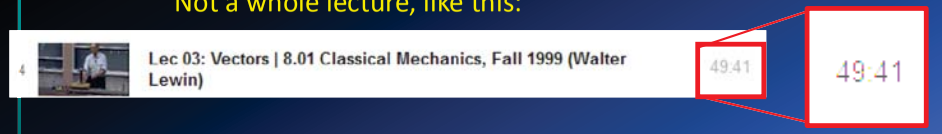
- Flipping - what is it?
- Problems flipping solves
- Good practices
- Partial vs completely flipped classroom
- Outreach using YouTube
- How to do it:
  - Hosting, equipment and software
  - Camtasia software demonstration

Good Practices

Video length (minutes):

- 4-6 general education
- 5-7 intermediate course
- > 10 never

Not a whole lecture, like this:



Which is more tempting to watch?

Good Practices

Quizzes, to coerce students to view videos.

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Quizzes, to coerce students to view videos.

Ways to quiz:

- In class:
  - Clickers
  - Paper
- Immediately after the movie:
  - Flash/HTML5
  - ICON

Motivation is either:

- Grade for quiz
- Unlocking access to required online materials

Good Practices

Example paper quiz question
for Electronics (an intermediate course for physics majors)

Which is true for an ideal op-amp:

	Voltages at the two inputs	The output voltage
(a)	same	responds to the input currents
(b)	different	responds to the input currents
(c)	same	responds to the input voltages
(d)	different	responds to the input voltages

Good Practices

Next 6 slides:

clicker quiz slides (Basic Physics -- a general education class)

Half-life

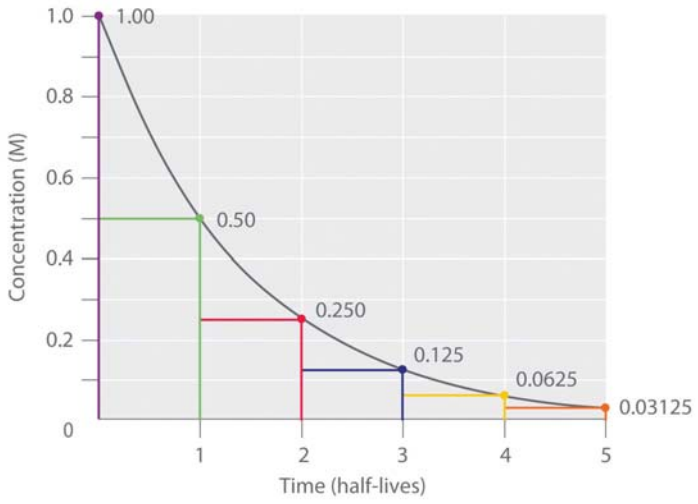
Example:

If half-life is 5 hours:

After 5 h, concentration 1/2 its original value
After 10 h, concentration is 1/4 its original value
After 15 h, concentration is 1/8 its original value

The radioactivity never vanishes. It just gradually gets smaller.

Half-life



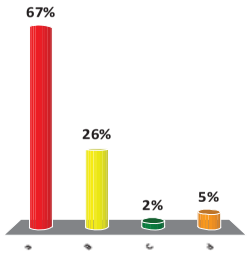
Clicker poll

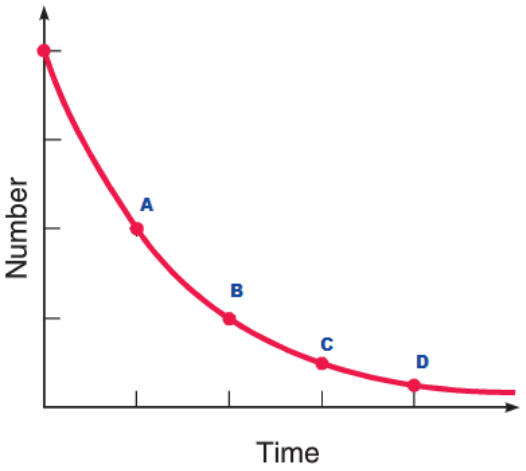
next slide

Clicker **poll**: you ARE allowed to discuss this with neighbor

The number of nuclei in a sample are plotted vs time.

At which data point is the time equal to the half-life?

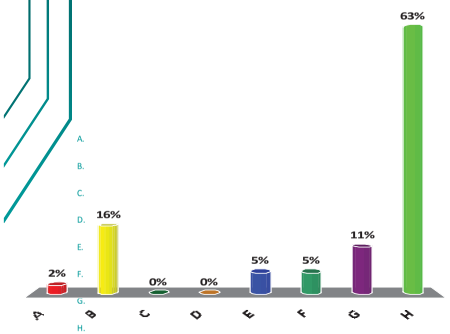




Clicker quiz (flip video)

Clicker **quiz**: you **ARE NOT** allowed to discuss this with neighbor

Which is correct regarding radiation PET imaging in medicine?



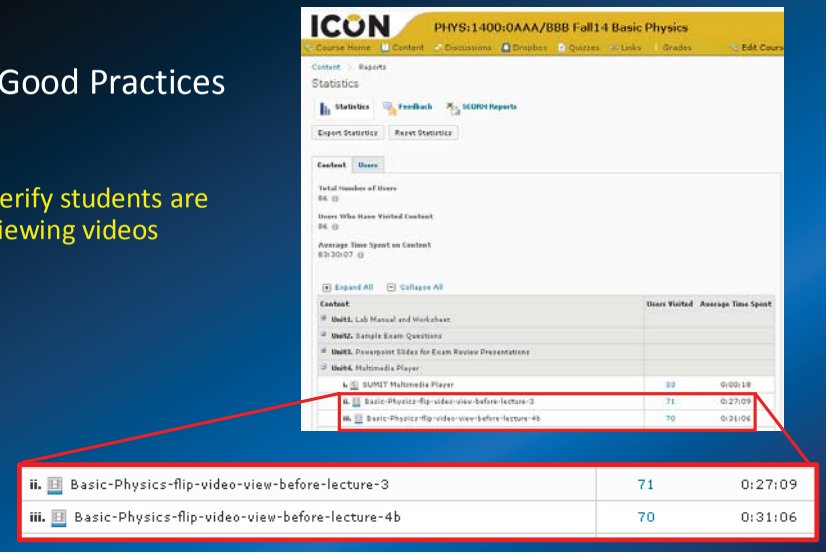
	Kinds of radiation detected	How it is produced
A	Alpha and gamma ray	$p + \overline{p}$
B	Alpha and gamma ray	$e^- + e^+$
C	Alpha ray only	$p + \overline{p}$
D	Alpha ray only	$e^- + e^+$
E	Beta and alpha rays	$p + \overline{p}$
F	Beta and alpha rays	$e^- + e^+$
G	Gamma ray only	$p + \overline{p}$
H	Gamma ray only	$e^- + e^+$

Before that quiz, students viewed this video (04:30)

Cue:
03:11

Good Practices

Verify students are viewing videos



Good Practices

Guiding the eye amongst the clutter

Example:
with PDF of handwritten notes

Good Practices

Guiding the eye amongst the clutter

Example:
with powerpoint

(cue 2:30 to 3:00)

Good Practices

Showing something
from a previous page

Good Practices

Showing something
from a previous page

(cue 0:00)

Good Practices

Movie players

Tell students: if the video looks bad
- try a different browser
- download & try a different player.

Student Feedback

Basic Physics – partially flipped

"Love the flip video."

"Flip videos are interesting."

"I liked the flip video because it helped me to connect what we learned in class to real-life applications."

"Flip videos, clicker, etc, are greatly appreciated. The flip vids prepare me for class."

"Flip videos could be improved a little bit to make them more beneficial when it comes to class material."

"The flip videos weren't very helpful."

Student Feedback

Electronics

Midterm exam statistics

Average score increased $p = 0.02$

76% fully flipped 2015 ($N = 9$)

56% traditional 2014 ($N = 21$)

Poll, at midterm, which do students prefer:

8 continue with flip videos

0 switch to traditional lectures

1 no preference

Comment re. increased discussion & examples during class:

"extremely beneficial"

Student Feedback

What some students don't like:

Time: Forced to spend more time out of class

(College Physics, Univ. Alabama Birmingham)

Stress: graded timed problem-solving during class

(Elec. Engineering, Univ. Iowa)

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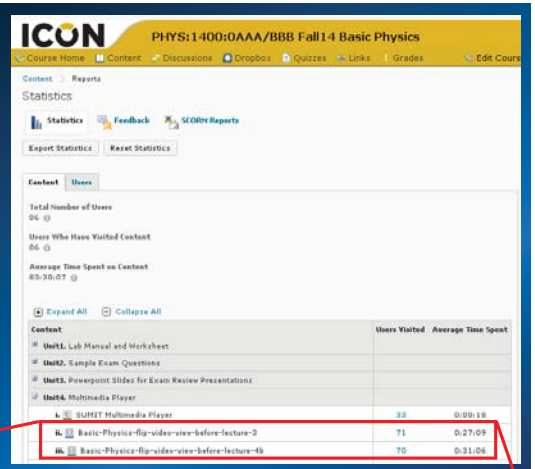
Hosting

ICON

- Password protected
- Track student viewing



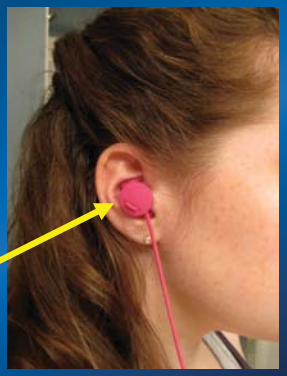
Equipment

Camera

Microphone

Mic quality is crucial

This is where you are



Equipment

USB microphone (built-in mic is not recommended)

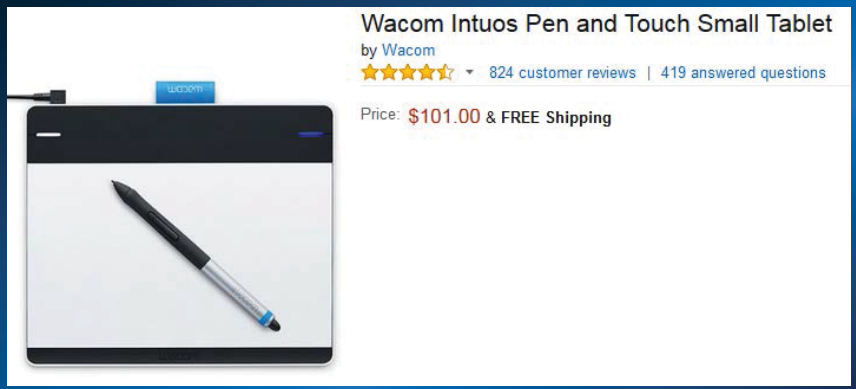
Equipment

Camera:

USB (typically $60)
or
built-in (FREE)

Equipment

Tablet device - only if you want to "whiteboard"



Software

Lecture capture:

- Camtasia ~ $100
- PANOPTO FREE UI license

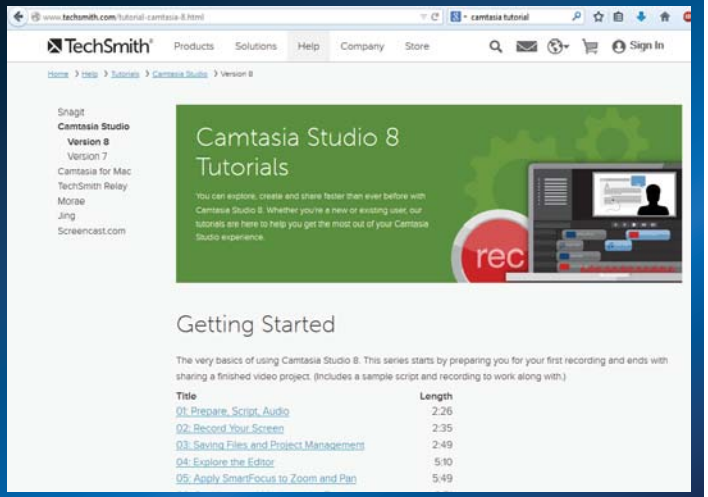
Drawing (for whiteboarding with tablet):

- SmoothDraw FREE

Screen shots & cropping

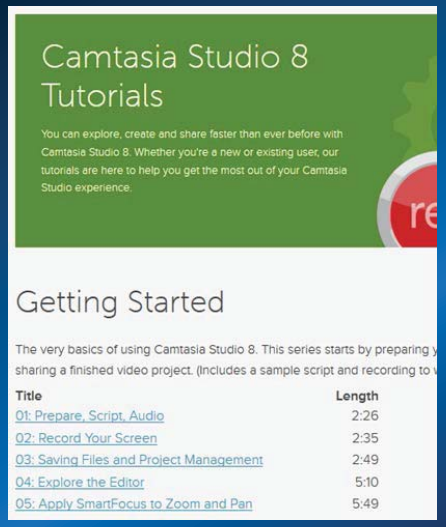
- Microsoft Paint FREE

How to learn Camtasia



Camtasia demonstration

www.techsmith.com/tutorial-camtasia-8.html



PANOPTO

Free license UI

PC or Mac

http://its.uiowa.edu/uicapture

Training: Greg Johnson, CLAS

Summary

What is Flipping?

- Short videos viewed before class.
- Discussion or other activity during class.

How much time does it take?

For easy migration, use what's familiar:

- your old handwritten notes or slides
- the same classroom
- ICON