

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

- 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

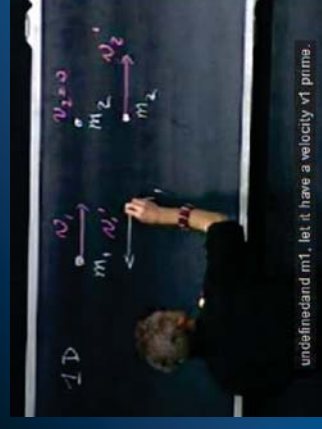
Approach #1: flip video using **pdf** handwritten notes



Approach #2: flip video using **powerpoint**



Approach #3: **Whiteboard** screencast  
(requires tablet device)



Compare to a video capture of a traditional lecture

credit: [khanacademy.org](https://khanacademy.org)

Prof. Walter Levin, MIT OpenCourseWare



## Problems that flipping solves



## What to do during class?

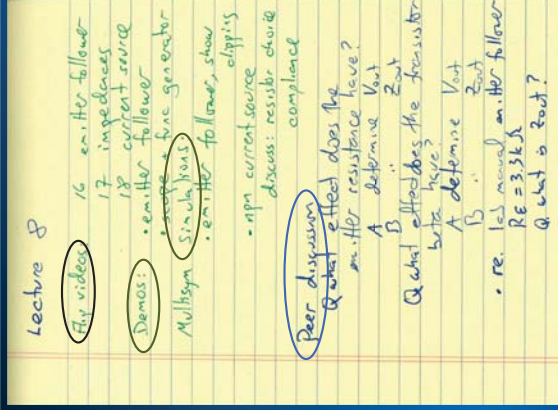
With flipping, you have more time. What to do with it?

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:



Lec 03: Vectors | 8.01 Classical Mechanics, Fall 1999 (Walter Lewin)

49:41

Which is more tempting to watch?

Understanding Forensic Pathology- Lecture by Dr. Michael Pollanen  
<https://wimeo.com/70083353>  
Jul 10, 2013  
This is just a 10 minute segment of the lecture that was given by Dr. Michael Pollanen. The complete lecture is ...

Medical School Pathology, Chapter 25 - YouTube  
[www.youtube.com/watch?v=BydIPPFIEc](http://www.youtube.com/watch?v=BydIPPFIEc)  
Apr 16, 2012 - Uploaded by Dr. Prodigious  
Chapter 25 -- The Skin (Robbins Pathology) Other chapters-  
[http://www.youtube.com/playlist?list ...](http://www.youtube.com/playlist?list...)

## Good Practices

Quizzes, to coerce students to view videos.

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### 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:

- |     |                                   |                                |
|-----|-----------------------------------|--------------------------------|
|     | <u>Voltages at the two inputs</u> | <u>The output voltage</u>      |
| (a) | <u>same</u>                       | responds to the input currents |
| (b) | <u>different</u>                  | responds to the input currents |
| (c) | <u>same</u>                       | responds to the input voltages |
| (d) | <u>different</u>                  | responds to the input voltages |

## Good Practices

Next 6 slides:

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

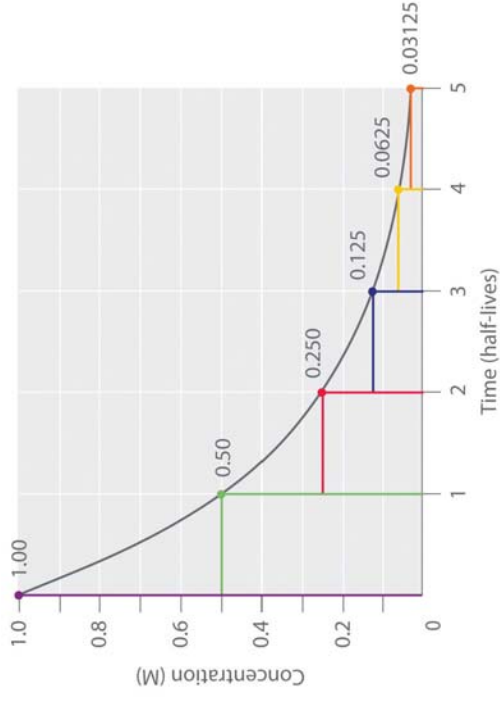
### Half-life

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.



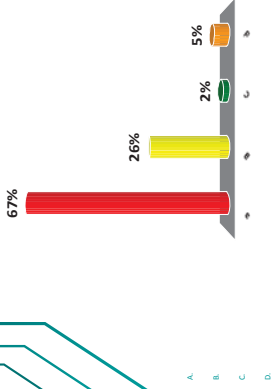
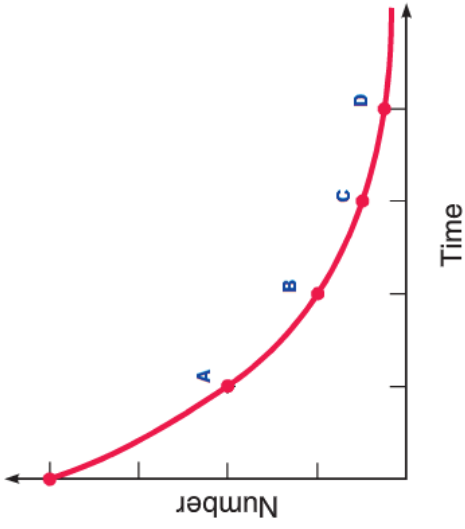
### Half-life

[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.

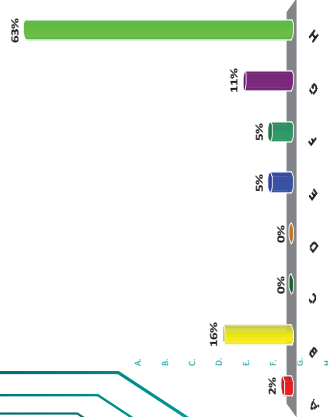
At which data point is the time equal to the half-life?



[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	$p + \bar{p}$
B Alpha and gamma ray	$e^- + e^+$
C Alpha ray only	$p + \bar{p}$
D Alpha ray only	$e^- + e^+$
E Beta and alpha rays	$p + \bar{p}$
F Beta and alpha rays	$e^- + e^+$
G Gamma ray only	$p + \bar{p}$
H Gamma ray only	$e^- + e^+$



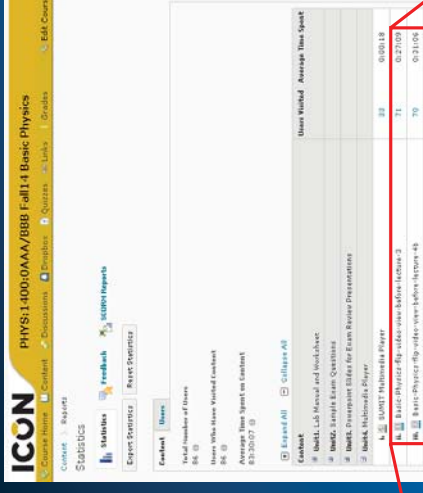
Before that quiz, students viewed this video (04:30)



Cue:  
03:11

## Good Practices

Verify students are  
viewing videos



ii. Basic-Physics-flip-video-view-before-lecture-3 0:27:09  
iii. Basic-Physics-flip-video-view-before-lecture-4b 0:31:06

## Good Practices

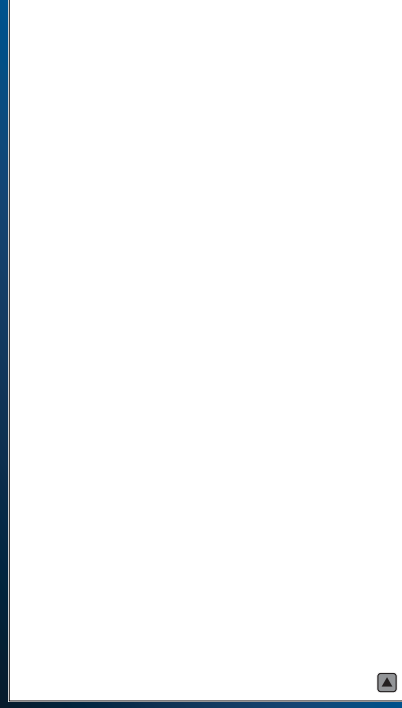
Guiding the eye amongst the clutter



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)

## 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

## Hosting

ICON

- Password protected
- Track student viewing

Item	Users Viewed	Average Time Spent
Basic-Physics-flip-video-view-before-lecture-3	71	0:27:09
Basic-Physics-flip-video-view-before-lecture-4b	70	0:31:06

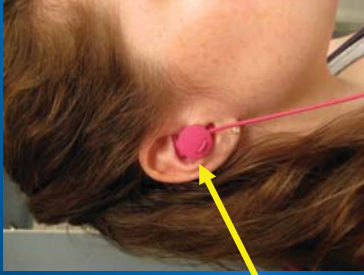
ii. Basic-Physics-flip-video-view-before-lecture-3

iii. Basic-Physics-flip-video-view-before-lecture-4b

## Equipment

Camera

Microphone




Mic quality is crucial

This is where you are

## Equipment

USB microphone (built-in mic is not recommended)



Audio-Technica AT2020USB  
Cardioid Condenser USB  
Microphone  
by Audio-Technica  
★★★★☆ 536 customer reviews  
| 123 answered questions  
List Price: \$449.00  
Price: **\$129.00 & FREE Shipping.**

## Equipment



Camera:

USB (typically \$60)

or

built-in (FREE)

## Equipment

Tablet device - only if you want to "whiteboard"



Wacom Intuos Pen and Touch Small Tablet  
by Wacom  
★★★★☆ 824 customer reviews | 419 answered questions  
Price: **\$101.00 & FREE Shipping**

## Software

### Lecture capture:

-  ~ \$100
-  FREE UI license

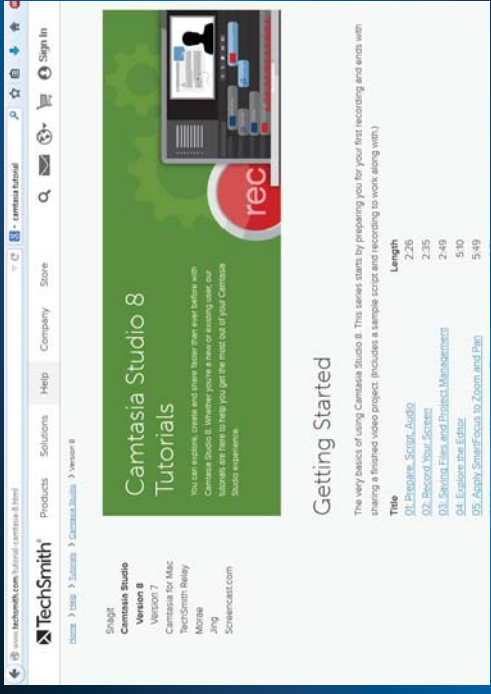
### Drawing (for whiteboarding with tablet):

- SmoothDraw FREE

### Screen shots & cropping

- Microsoft Paint FREE

## How to learn Camtasia



**Getting Started**

The very basics of using Camtasia Studio 8. This series starts by preparing you for your first recording and ends with sharing a finished video project (includes a sample script and recording to work along with.)

Title	Length
01. Prepare, Script, Audio	2:26
02. Record Your Screen	2:35
03. Saving Files and Project Management	2:49
04. Explore the Editor	5:10
05. Apply SmartFocus to Zoom and Pan	5:49

## Camtasia demonstration



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[www.techsmith.com/tutorial-camtasia-8.html](http://www.techsmith.com/tutorial-camtasia-8.html)



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