

## Conflicts “of interest”

### Using Multimedia & Education Technology to Enhance Teaching

**David H. Roberts, MD**

Associate Director, Carl J. Shapiro Institute for Education & Research

Associate Director, The Academy at HMS

Associate Professor of Medicine, HMS

- Financial
  - Co-creator of [www.knowyourph.org](http://www.knowyourph.org) with Dr. Michael Parker, HMS Center for Ed Tech
  - Licensing fees from Gilead, Inc.
- Academic interest
  - This topic and relation to Millennial learners
  - CME courses training faculty to teach
- Genetics

Education is at the heart of patient care. — Shapiro Institute



### Goals for our time together today

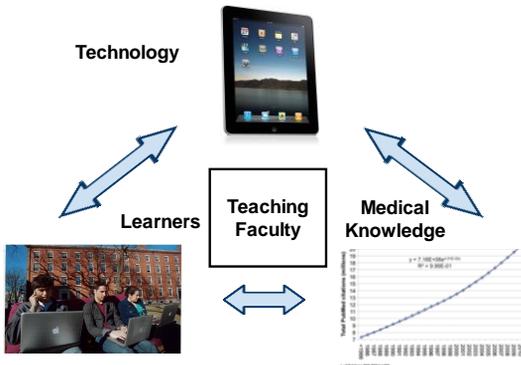
- Share an approach to using technology in teaching \*\*\*
- Demonstrate a few of the multitude of possible multimedia and education technologies available
  - Resources at many medical schools
  - Free resources online
- Provide examples of how students are using technology to enhance their learning
- Encourage you to try something new in your own teaching

\*\*\*Merely a curious, risk-taking teacher interested in trying new things



Let's begin with a framework

## Our current challenge



## Teaching & Education Technology, Part I

Good teaching is about good content.  
Technology is merely a tool.



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## Teaching & Education Technology, Part II

Using technology in teaching is a  
(learnable) skill.

**Learning those skills = faculty  
development**



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Education technology is not new!



“The only thing certain is change” -- Socrates



## Emergence of Education Technology

- E-learning or computer-based learning has been around for decades
- Adoption accelerated by
  - Internet
  - Learning management systems – ie MyCourses, Blackboard
  - Many free or low cost tools
- Many institutions have education technology / media centers



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## The Impact of E-Learning in Medical Education

Jorge G. Ruiz, MD, Michael J. Mintzer, MD, and Rosanne M. Leipzig, MD, PhD

Academic Medicine, Vol. 81, No. 3 / March 2006

- E-learning is complementary to and is as effective as instructor-led learning (\*)
- Advantages include improving
  - Learning “delivery”
  - Learning “enhancement”
- Unique opportunities
  - individualized or adaptive learning
  - collaborative learning



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\*Chumley-Jones et al, Web-based learning, Acad Med 2002

## Foundations of Multimedia Learning

- Constructivist learning theory
  - Piaget and many others
  - Active engagement
- Dual coding theory
  - Paivio and many others
  - Visual and verbal information processed independently
- Cognitive load theory
  - Sweller, Miller and others
  - Linking information and problem solving
  - “Chunking” of information



"For those of us who aren't visual learners... AAAUUUGGGGHHHHH!!!!!"



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Soto Mas, Health Prom Prac 2003; 4:288-92

What you present to your audience

What you assume the audience learns



Atkinson, Beyond Bullet Points, 2008



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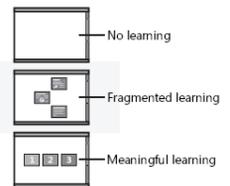
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What actually happens

What you present to your audience



Atkinson, Beyond Bullet Points, 2008



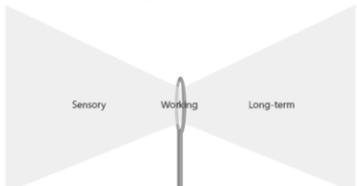
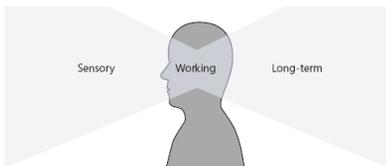
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Atkinson, Beyond Bullet Points, 2008



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"I need someone well versed in the art of torture—do you know PowerPoint?"

The New Yorker

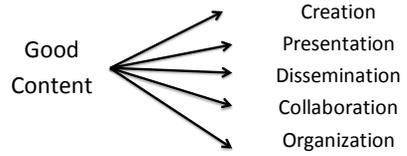
## Applying multimedia design principles enhances learning in medical education

Nabil Issa,<sup>1</sup> Mary Schuller,<sup>1</sup> Susan Santacaterina,<sup>1</sup> Michael Shapiro,<sup>1</sup> Edward Wang,<sup>1</sup> Richard E Mayer<sup>2</sup> & Debra A DaRosa<sup>1</sup>  
*Medical Education* 2011; 45: 818–826

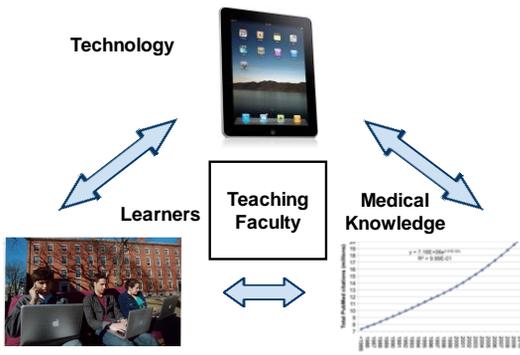
- Better short term recall (retention)
- Better “learning” (overall quiz score)

BEFORE	AFTER
<p><b>[IV] Obstructive Shock</b></p> <ul style="list-style-type: none"> <li>• Tension Pneumothorax: results in hyperinflation of the hemithorax resulting in kinking of IVS and decreased preload</li> <li>• Pulmonary embolism: results in obstruction of the R ventricular outflow and decrease in L ventricular stroke volume resulting in cardiac failure</li> </ul>  	<p><b>[IV] Obstructive Shock</b></p> <ul style="list-style-type: none"> <li>• Tension Pneumothorax</li> <li>• Pulmonary Embolism</li> <li>• Cardiac Tamponade</li> </ul>   

## Technology can enhance many aspects of learning and teaching



## Returning to our framework



## How will we respond to this challenge?

“...The world is changing very rapidly. Yet ...education changes remarkably little over time.  
 ...Education will be more about how to process and use information and less about imparting it...factual mastery will become less and less important.  
 ...Tasks will be carried out with far more collaboration...  
 ...New technologies will profoundly alter the way knowledge is conveyed.”



Larry Summers  
 What you (Really) need to know  
 NY Times, Jan 22, 2012



## HILT SYMPOSIUM 2012

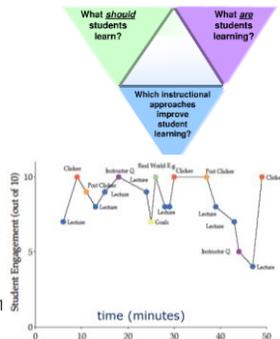
Harvard Initiative for Learning & Teaching



Physics Nobel Laureate Professor Carl Wieman  
 Improved Learning in a Large-Enrollment Physics Class

Louis Desautels,<sup>1,2</sup> Ellen Schreier,<sup>2</sup> Carl Wieman<sup>1,2\*</sup>

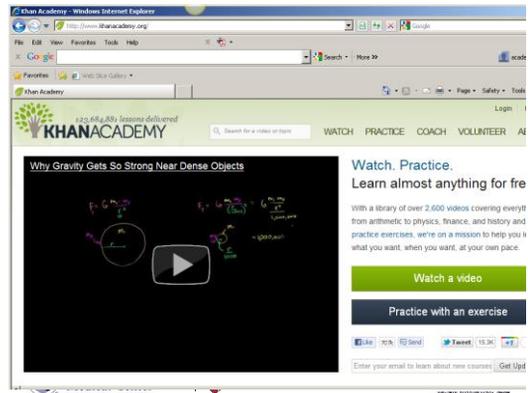
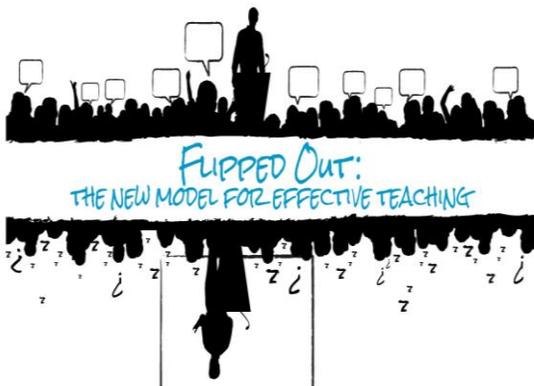
SCIENCE VOL 332 13 MAY 2011



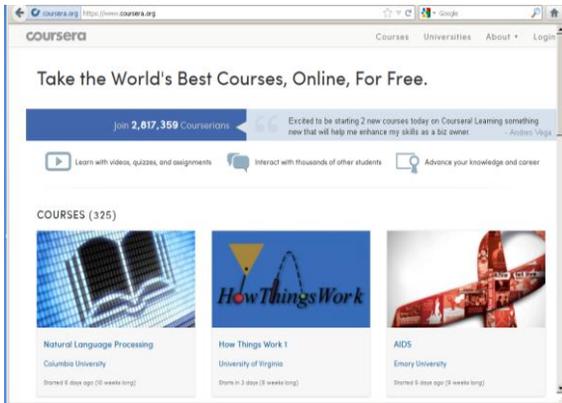
**'Flipped' classrooms take advantage of technology**

By Greg Toppo, USA TODAY Updated 10/7/2011 2:39 AM

POTOMAC, Md. – Step into Stacey Roshan's Advanced Placement calculus class some morning and two things become apparent: The students don't seem stressed-out, as AP students often do. And the teacher is barely teaching.



Khan Academy Style Video Lectures



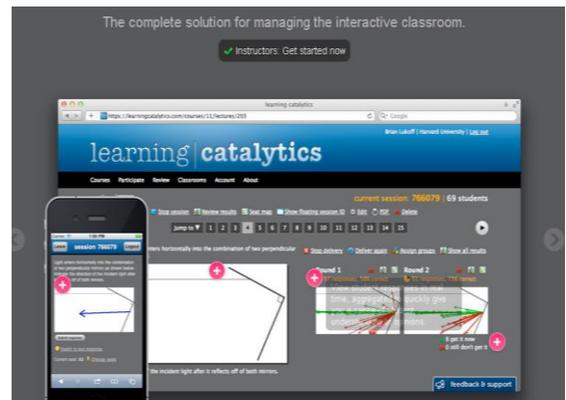
Harvard Physics Professor Eric Mazur



Mazur likes a Camus quote: "Some people talk in their sleep. Lecturers talk while other people sleep."

### Think-Pair-Share

- What is most commonly missed fracture in the Emergency Department?
  - A) Clavicle
  - B) 4<sup>th</sup> Metatarsal
  - C) Lunate (wrist)
  - D) 10<sup>th</sup> Rib
  - E) None of the above

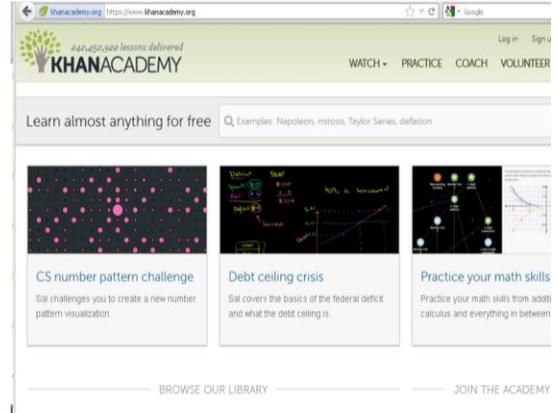


## Can screen capture technology improve learning of complex concepts?

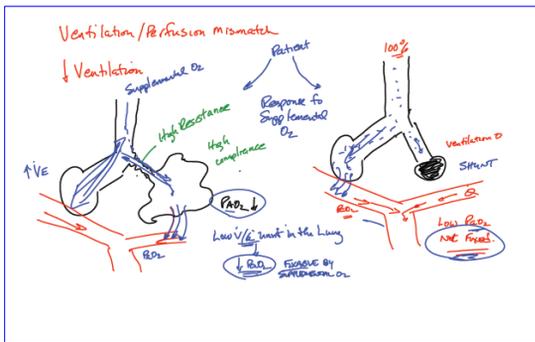


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## Concept videos



## Can the classroom be designed to enhance learning using technology?



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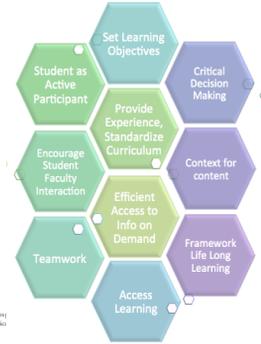




As teachers, what should we ask?

How can technology assist in maximizing principles of adult learning?

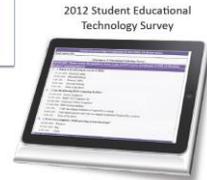
What is the "value add" to technology? Why is it better than not using technology?



The Twenty-First-Century Student

Student Use of Technology

1. Student Computing Trends
2. Student Software Trends
3. What students want changed?



Student Use of Technology

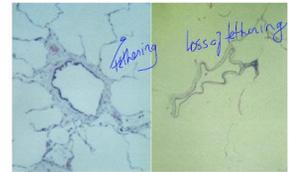
- Students use technology to enhance learning
  - Complex concepts
  - Exploring resources
  - "Saving time"
  - Mobile devices
  - iPad Apps
  - Social networking

36% Students have iPads  
Higher % in pre-clinical years  
iPad is top "next purchase"



COPD: Progressive airflow limitation that is not fully reversible

- **Emphysema:** Lung tissue destruction & air space enlargement
- **Chronic Bronchitis:** Productive cough for at least 3 months in 2 successive years



Normal      Emphysema

Asthma=Reversible

# HILT SYMPOSIUM 2012

Harvard Initiative for Learning & Teaching



Harvard English Professor  
Steven Pinker

## 4 "ages" of information

fundamental  
changes to how information  
and ideas are shared and  
disseminated



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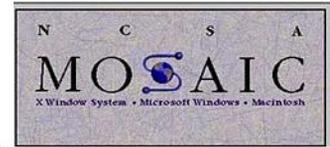
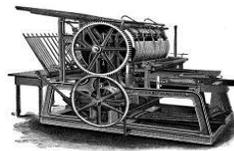


Writing on Tablets, Sumeria, 3000 BC



Gutenberg, Movable Type, c. 1440

Printing press, c. 1800



Mosaic 1.0 (web browser) 1993

## The Times They Are a-Changin'



1998



2004



2005



2006



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## Are you learning this...?

2013, 36: 8-14  
MEDICAL  
NUMBER

### TWELVE TIPS

Twelve tips for using Twitter as a learning tool  
in medical education

SARAH EDITH FORGIE, JON P. DUFF & SHELLEY ROSS  
University of Alberta, Canada



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**On Point**  
with Tom Ashbrook

TODAY IS THURSDAY, FEBRUARY 23, 2012

LISTEN TO THIS SHOW

Tuesday, January 24, 2012 at 11:00 AM EST

The Digital Future Of Textbooks

The revolution brewing in your child's backpack. One little computer tablet may soon replace all those big old textbooks.

## Can we create a truly integrated, multimedia tool to enhance learning?



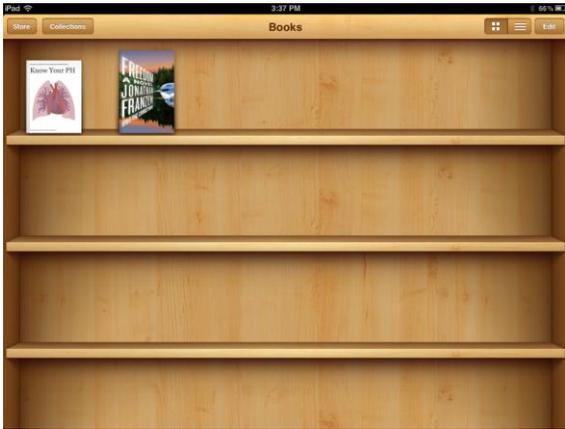
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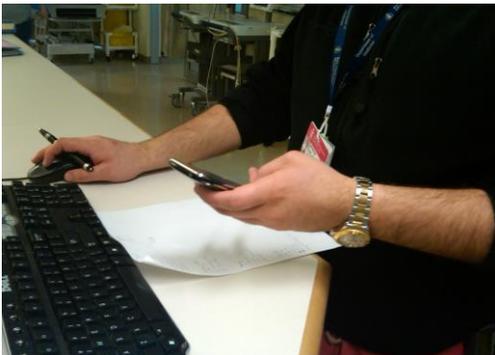
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Technology enhances teaching and learning during medical training



Are there downsides to technology in medical training?



As Doctors Use More Devices, Potential for Distraction Grows



"It's just holding in there are in danger," said Dr. Peter J. Papadatos, of the University of Rochester Medical Center.  
By MATT RICHELLE  
Published December 14, 2011



Technology poses new challenges for students in the realm of professionalism

- Medical blogging
- Interruptions by ringing phones
- Cameras ubiquitous
- Privacy settings on Facebook
- Linking to patients via email and social networking



Are there pedagogic downsides to technology?

"The Knowledge Constrictor"  
New York Times  
September 19, 2010  
Ben Greenman

Anaconda



## Are there pedagogic downsides to technology?

“The Knowledge Constrictor”

New York Times  
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Reticulated  
Python

Loss of  
“Productive Frustration”



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## Why should you try to incorporate technology in your teaching

- It's engaging
- It's easy (w/practice)
- It's fun
- Our learners are digital natives and want / demand this



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## Try something new!

- Teach beyond CONTENT
- Disseminate your work
- Think about the HOW's
  - How will students best learn?
  - How will they engage?
  - How will they view this?
  - How will they share this?



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