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Harvard Medical School

Using Multimedia & Education Technology to Enhance Teaching

David H. Roberts, MD

Director, International Programs, Shapiro Institute

Dean for External Education, HMS

Associate Professor of Medicine, HMS

Education is at the heart of patient care. —



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Conflict of Interest Disclosure

David Roberts, MD

Gilead Inc.

Role: Consultant

Compensation: Licensing Fees

Read by QxMD

Role: Advisor

Compensation: None

2 Minute Medicine

Role: Advisor

Compensation: None



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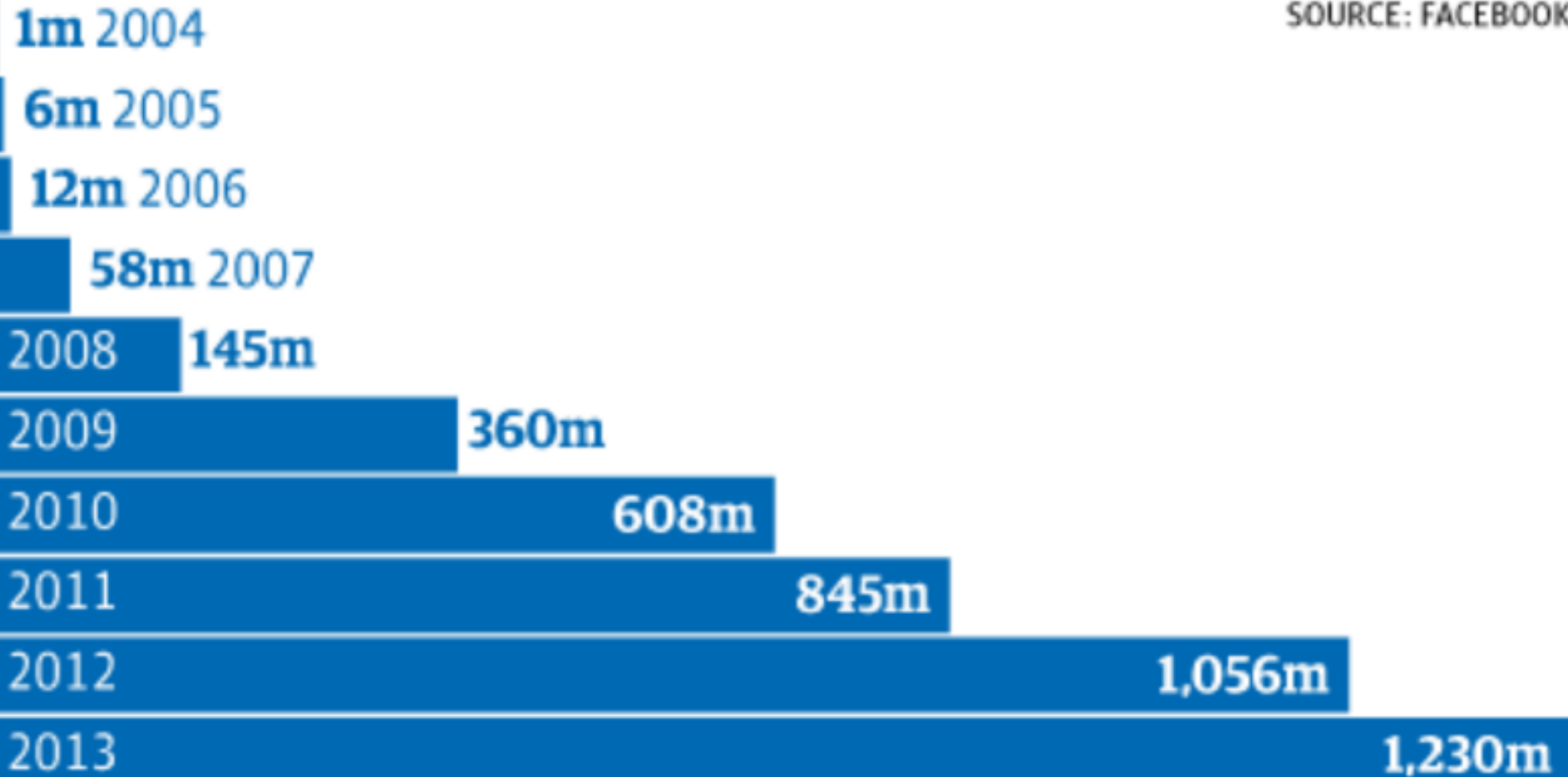


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Facebook monthly users

SOURCE: FACEBOOK



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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**



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A large, tiered lecture hall filled with students. Many students in the foreground are using laptops. The text "Let's begin with a framework" is overlaid in the center of the image.

Let's begin with a framework

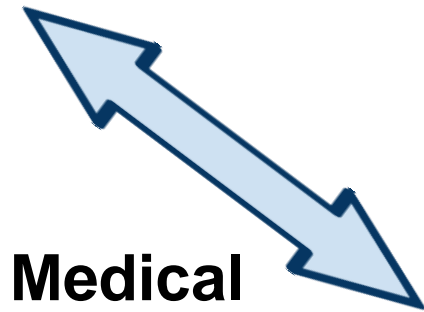
Our current challenge

Technology

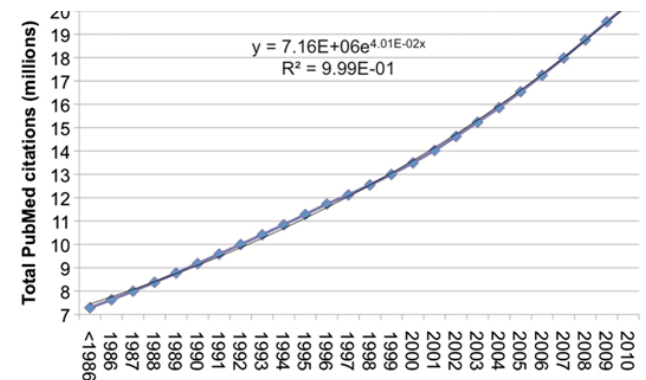


Learners

**Teaching
Faculty**



**Medical
Knowledge**



Technology is intimately linked with Medical Training

Good teaching is about good content.

Technology is merely a tool.

Faculty development is key.



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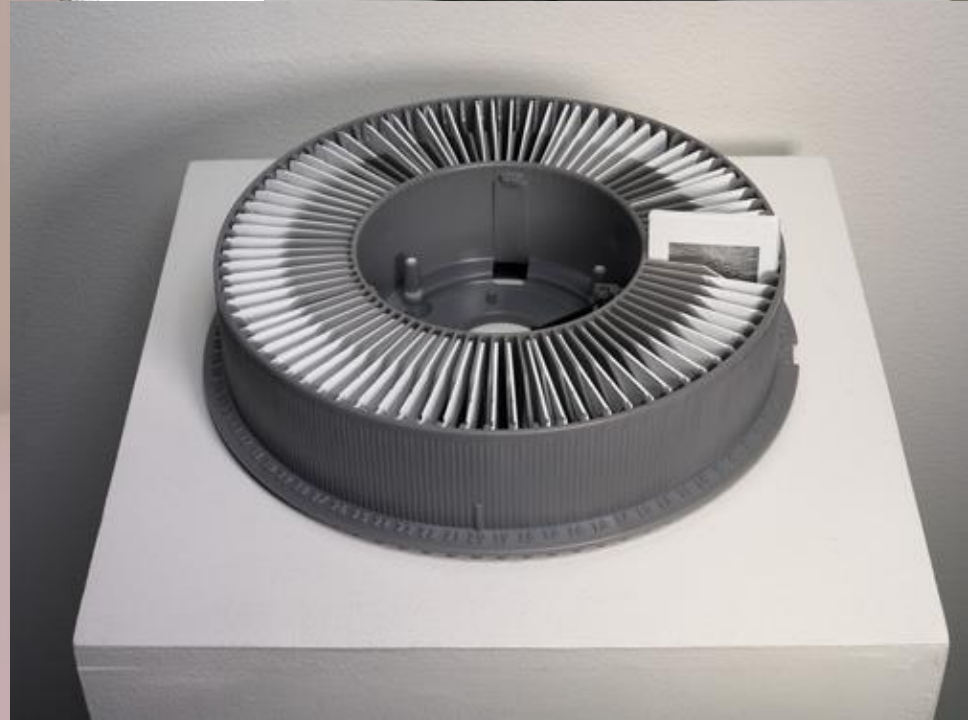
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Education technology is not new!



“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



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Applying multimedia design principles enhances learning in medical education

Nabil Issa,¹ Mary Schuller,¹ Susan Santacaterina,¹ Michael Shapiro,¹ Edward Wang,¹ Richard E Mayer² & Debra A DaRosa¹

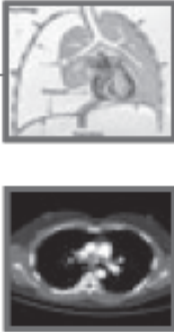
Medical Education 2011; 45: 818–826

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

BEFORE

[IV] Obstructive Shock

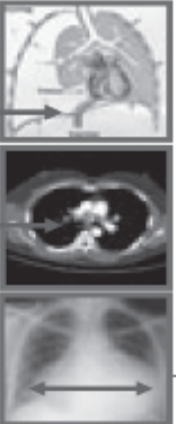
- Tension Pneumothorax: results in hyperinflation of the hemithorax resulting in kinking of IVS and decreased preload
- Pulmonary Embolism: results in obstruction of the R ventricular outflow and decrease in L ventricular stroke volume resulting in cardiac failure



AFTER

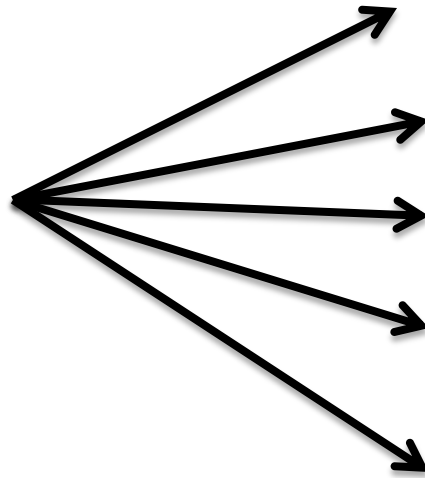
[IV] Obstructive Shock

- Tension Pneumothorax
- Pulmonary Embolism
- Cardiac Tamponade



Technology can enhance many aspects of learning and teaching

Good
Content



Creation
Presentation
Dissemination
Collaboration
Organization



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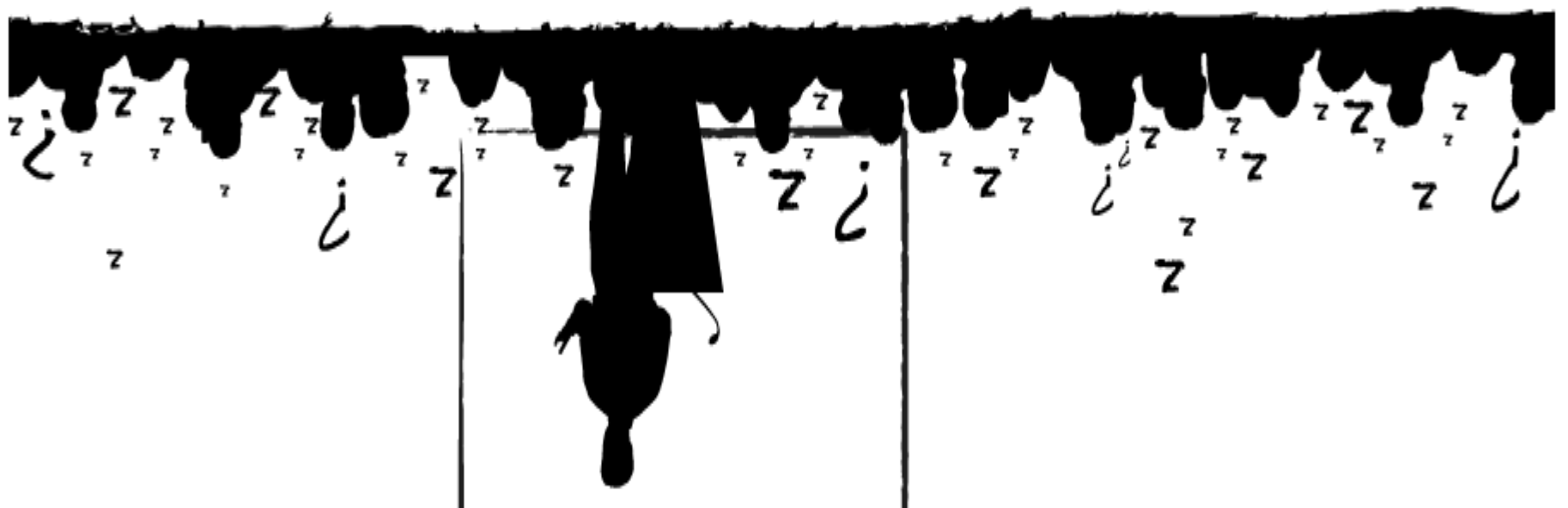
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FLIPPED OUT: THE NEW MODEL FOR EFFECTIVE TEACHING



Khan Academy - Windows Internet Explorer

http://www.khanacademy.org/

File Edit View Favorites Tools Help

Google Search More >>

Khan Academy



123,684,881 lessons delivered

KHANACADEMY

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Like 707k Send Tweet 15.3K

Enter your email to learn about new courses Get Updated

Khan Academy Style Video Lectures

MOOC – Massive open online course

The image shows a screenshot of the Coursera website homepage. At the top, there is a navigation bar with the Coursera logo on the left and links for 'Courses', 'Universities', 'About', and 'Login' on the right. Below the navigation bar is a large heading: 'Take the World's Best Courses, Online, For Free.' Underneath this heading is a blue banner that says 'Join 2,817,359 Courserians' followed by a quote: 'Excited to be starting 2 new courses today on Coursera! Learning something new that will help me enhance my skills as a biz owner.' - Andres Vega. Below the banner are three icons with text: a play button icon for 'Learn with videos, quizzes, and assignments', a speech bubble icon for 'Interact with thousands of other students', and a ribbon icon for 'Advance your knowledge and career'. The main content area is titled 'COURSES (325)' and features three course cards. The first card is for 'Natural Language Processing' by Columbia University, which started 6 days ago and is 10 weeks long. The second card is for 'How Things Work 1' by the University of Virginia, which starts in 3 days and is 6 weeks long. The third card is for 'AIDS' by Emory University, which started 5 days ago and is 9 weeks long.

courseera.org https://www.coursera.org

Google

courseera Courses Universities About Login

Take the World's Best Courses, Online, For Free.

Join **2,817,359** Courserians


Excited to be starting 2 new courses today on Coursera! Learning something new that will help me enhance my skills as a biz owner. - Andres Vega

Learn with videos, quizzes, and assignments


Interact with thousands of other students

Advance your knowledge and career


COURSES (325)



Natural Language Processing
Columbia University
Started 6 days ago (10 weeks long)

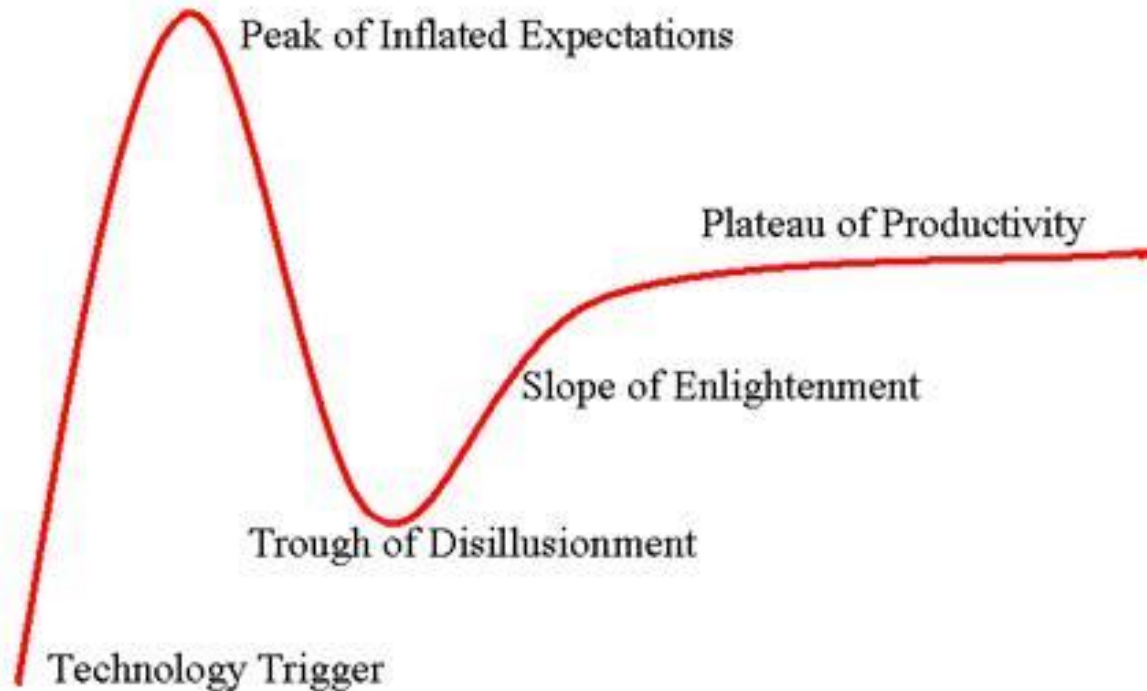


How Things Work 1
University of Virginia
Starts in 3 days (6 weeks long)



AIDS
Emory University
Started 5 days ago (9 weeks long)

Gartner Hype Cycle



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Concept videos

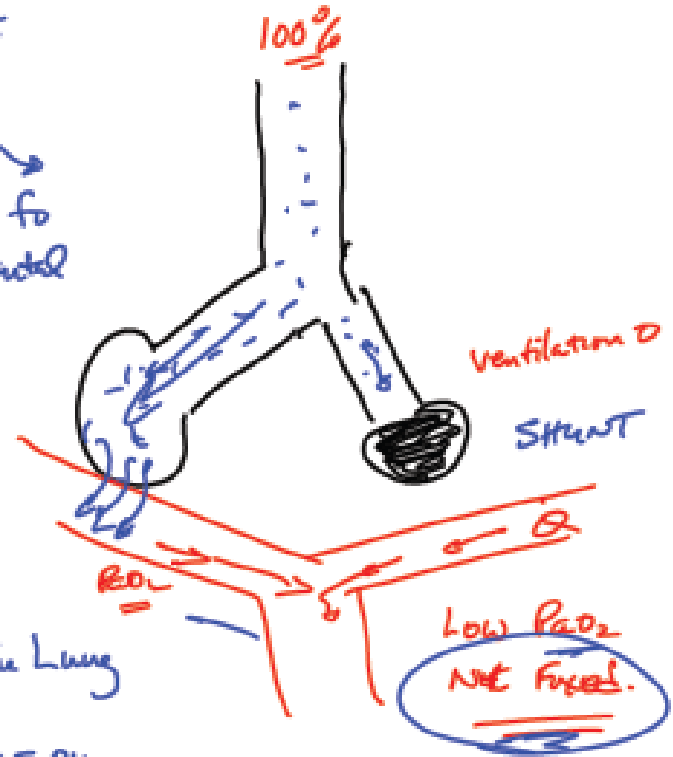
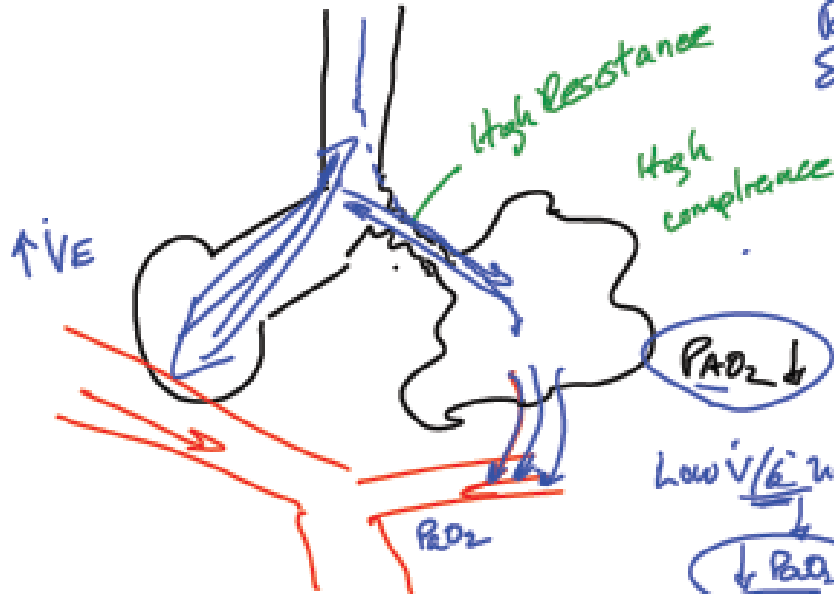
Ventilation/Perfusion mismatch

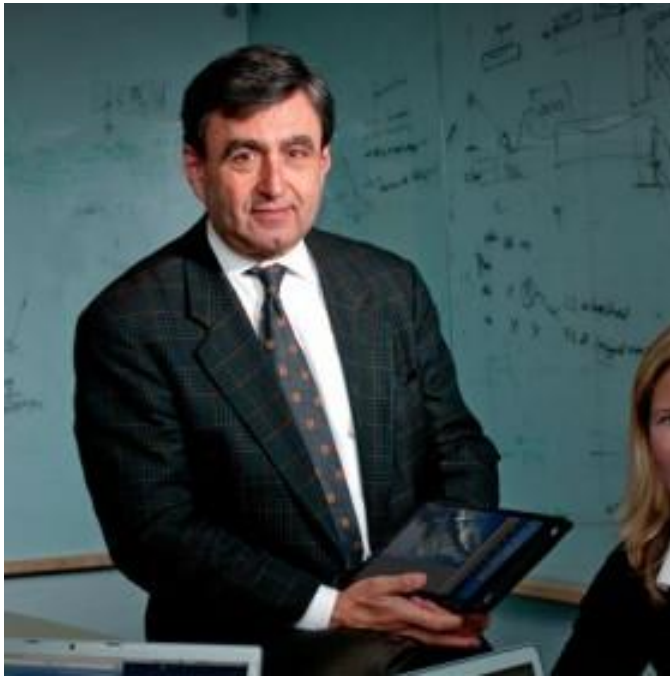
↓ Ventilation

Supplemental O₂

Patient

Response to Supplemental O₂





**Harvard Physics Professor
Eric Mazur**



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



HILT SYMPOSIUM 2012

Harvard Initiative for Learning & Teaching

2012

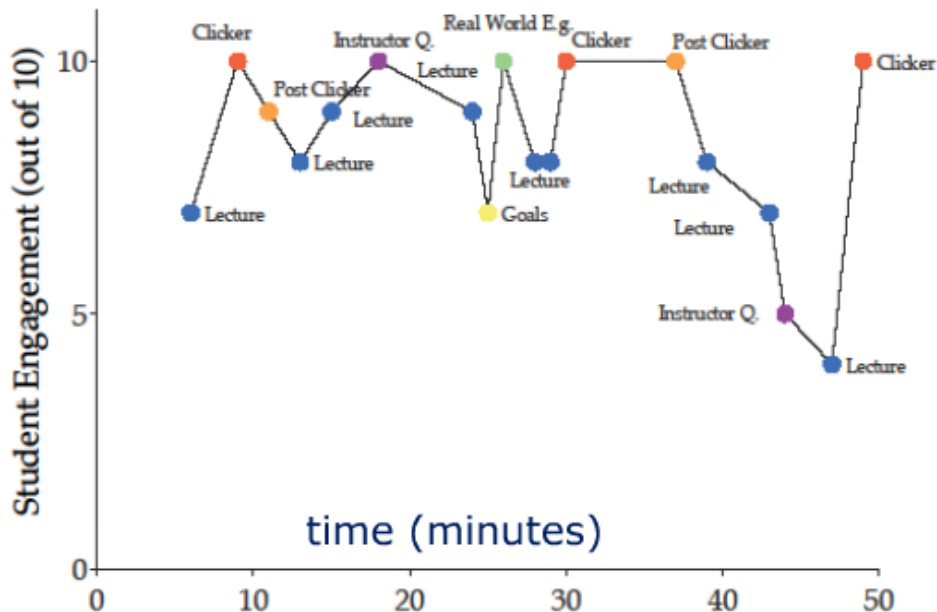
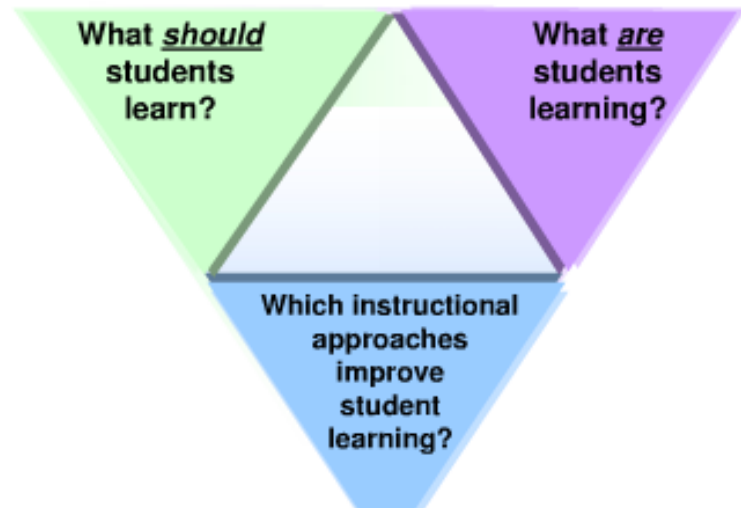


Physics Nobel Laureate Professor Carl Wieman

Improved Learning in a Large-Enrollment Physics Class

Louis Deslauriers,^{1,2} Ellen Schelew,² Carl Wieman*†‡

SCIENCE VOL 332 13 MAY 2011



Trainees' use of Technology

- Trainees use technology to enhance learning
 - Complex concepts
 - Exploring resources
 - “Saving time”
 - Mobile devices
 - iPad Apps
 - Social networking

36% trainees have iPads
Higher % in medical schools
iPad is top “next purchase”



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An advertisement for iMedicalApps. On the left, a smartphone displays the text "iSee Where to Find Apps". To the right, several app logos are shown: MyCourses, SCHOLARLOCKER (with the tagline "medicine. education. collaboration."), skyscape, and QxMD. At the bottom, the iMedicalApps logo is displayed with the tagline "Mobile medical app reviews & commentary by medical professionals".



The center for sharing and rating the most useful medical education resources available



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All Resources

All Schools

Advice

Questions and Answers

Reviews

Books and Products

Documents

All Resources

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Lippincott's Microcards: Microbiology Flash Cards by Sanjiv Harpavat and Sahar Nissim, Third Edition

posted by a student at Duke SOM on July 20, 2012

1 4 61

High-yield neuroanatomy for Step 1

posted by a student at UCSF on Feb. 11, 2012

1 4 118

Activity

- ▶ Resource Up Voted @ Harvard 17 hours, 56 minutes ago
- ▶ Comment Posted @ Harvard 1 day, 13 hours ago
- ▶ Resource Up Voted @ Duke 1 day, 13 hours ago
- ▶ Comment Posted @ Harvard 1 day, 13 hours ago
- ▶ Comment Posted @ Harvard 1 day, 15 hours ago
- ▶ Comment Posted @ Harvard 1 day, 15 hours ago
- ▶ Comment Posted @ Harvard

Just a friendly reminder... You're not currently logged in. Log in with one of the following to see what packs you already own:



Osmosis Question Packs

Osmosis questions are filled with detailed images, explanatory videos, and life-changing mnemonics that will help you learn and retain information more efficiently. You can answer the questions in the following packs via the innovative Osmosis interface, including push notifications, social learning through Osmose with your Friends, and the web platform with built-in Wikipedia articles!



Preclinical Foundations Pack

1050 questions



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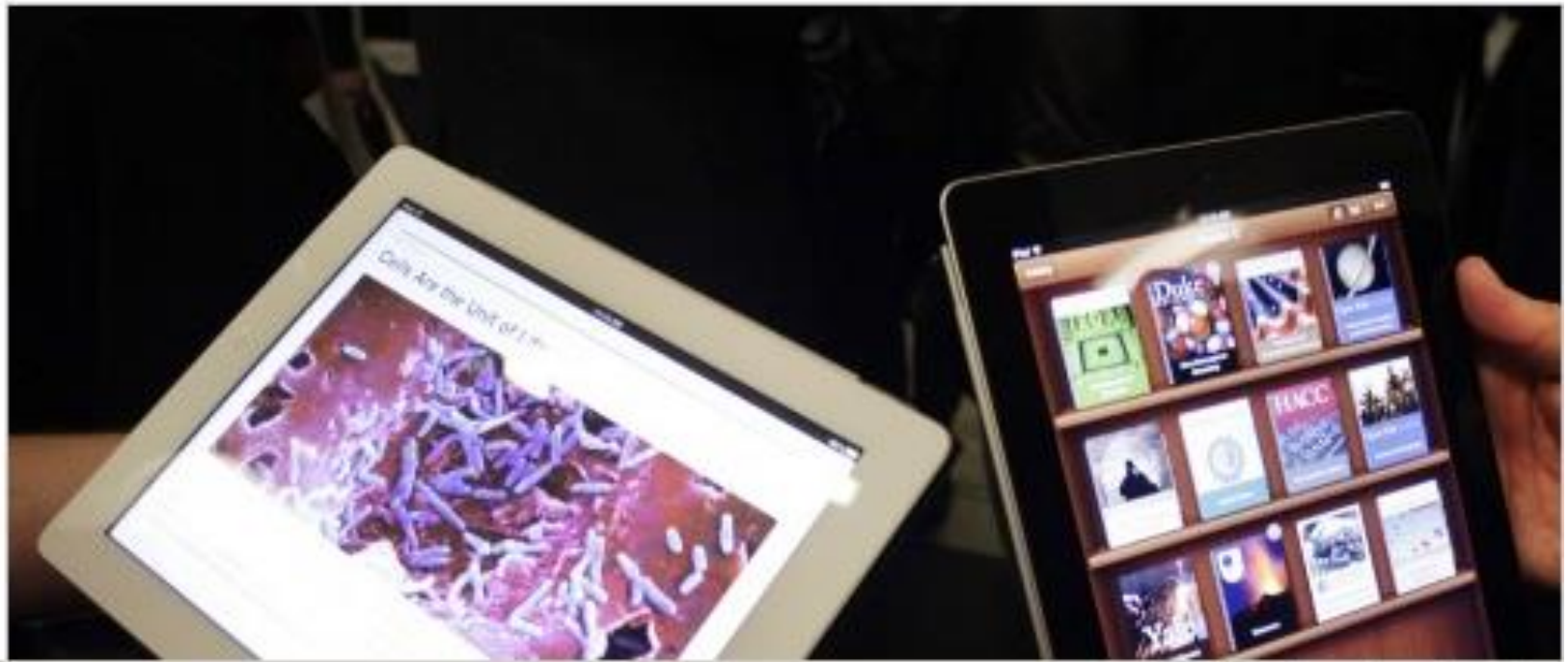


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The Digital Future Of Textbooks

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



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Personal Learning Environments and Adaptive Learning Platforms



Performance modeling
Dynamic course changes



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Modified from Dr. Catherine Lucey, UCSF

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4 “ages” of information

**fundamental
changes to how information
and ideas are shared and
disseminated**

**Harvard English Professor
Steven Pinker**



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The Times They Are a-Changin'



1998



2004



2005



2006



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Digests



Individual Journal Apps



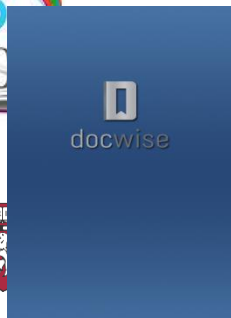
"Bundled" Journal Browsers



Read by QxMD

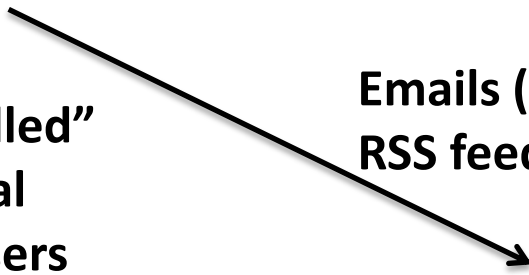


BrowZine



DocWise

Emails (eTOC) and RSS feeds



What's New in Academic Medicine

Articles from the January issue of Academic Medicine are now available online ahead of print!



Updated JNC 8 guidelines for antihypertensive drugs released



December 19, 2013 | Priyanka Vedak, Rif Rahman and Andrew Cheung, MD



Image: PD

1. Unlike the JNC 7 guidelines, JNC 8 guidelines do not focus on the definition of hypertension and pre hypertension. Instead it aims to define thresholds for pharmacological treatment. A strong recommendation is made to initiate pharmacologic treatment to lower blood pressure to less than 150/90 mm Hg in hypertensive patients aged 60 or older and to a diastolic goal of less than 90 mm Hg in hypertensive patients aged 30 to 59.

2. While JNC 7 recommended thiazide-type diuretics for initial therapy in the general population, JNC 8 makes a moderate recommendation for selection of initial treatment from a broader range of medications. A thiazide-type diuretic, calcium

Popular

Recent



The Child-Pugh score: Prognosis in chronic liver disease and cirrhosis [Classics Series]



Updated JNC 8 guidelines for antihypertensive drugs released



The NICE-SUGAR trial: Intensive blood glucose control significantly increases mortality in ICU patients [Classics Series]



The POISE trial: Perioperative use of beta-blockers [Classics Series]



The CLOT Trial: Dalteparin versus warfarin [Classics Series]



Vaginal misoprostol improves ease of IUD insertion



The RE-LY trial: Dabigatran non-inferior to warfarin in preventing strokes in patients with atrial fibrillation [Classics Series]



Silent myocardial infarctions more common than previously assumed



[Physician Comment] An argument against hospital

r u learning this...?

2013; 35: 8–14



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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Technology Cycles – Still Early Cycle on Smartphones + Tablets, Now Wearables Coming on Strong, Faster than Typical 10-Year Cycle

Technology Cycles Have Tended to Last Ten Years

*Mainframe
Computing*
1960s



*Mini
Computing*
1970s



*Personal
Computing*
1980s



*Desktop Internet
Computing*
1990s



*Mobile Internet
Computing*
2000s



*Wearable /
Everywhere
Computing*
2014+



Others?

As Doctors Use More Devices, Potential for Distraction Grows



Doug Benz for The New York Times

"My gut feeling is lives are in danger," said Dr. Peter J. Papadakos, of the University of Rochester Medical Center.

By MATT RICHTEL

Published: December 14, 2011

Hospitals and doctors' offices, hoping to curb medical error, have invested heavily to put computers, smartphones and other devices

 RECOMMEND

 TWITTER



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Are there pedagogic downsides to technology?

“The Knowledge Constrictor”

New York Times

September 19, 2010

Ben Greenman

Anaconda

Loss of

“Productive Frustration”



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Why should we incorporate technology in medical teaching and training?

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



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