RUSH UNIVERSITY
RUSH MEDICAL COLLEGE

Flipping The Classroom
September 30, 2015
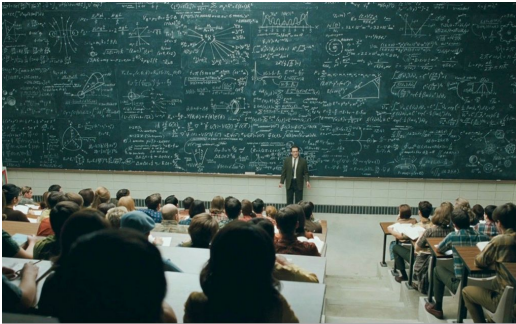711 AAC · RSVP with Judith Busse in OMSP

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For more information, handout and videos, or to comment or ask questions, follow this link:
http://bit.ly/1OE1MyC

Part 1. What is the flipped classroom?

Anatomy of a Normal Classroom

In class – passive transfer of knowledge	**At home** – active application of the knowledge
watch lectures as classwork there is little interaction between instructor and learner	do problem sets as homework student tries to apply knowledge alone without assistance

Anatomy of a Flipped Classroom
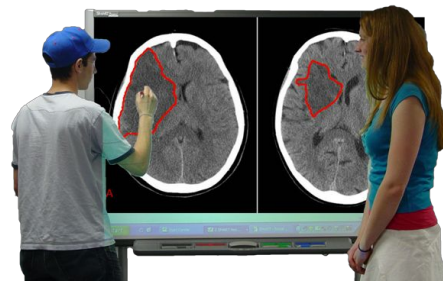
At home – passive transfer of knowledge	**In class** – active application of the knowledge
watch lectures as homework student reviews knowledge on their own time (can review as many times as needed)	do problem sets as classwork applies the knowledge in a social context can get help from other learners or instructor

Though technology is not a requirement (students can simply read a text at home), the popularity of hosted streaming video (such as YouTube) makes it easy to ubiquitously deliver video lessons to students.

Studies looking at the efficacy of the flipped class in health care mainly focus on student perceptions (they like it better) and there are some that show improved test scores.

Part 2. Create Clear Objectives

Bloom's taxonomy of objectives can be split into two sections:
- lower-order objectives focus on the acquisition of knowledge (a necessary, though usually passive process)
  - *Ex: List the components of the primary survey in the patient with traumatic injuries.*
- higher-order objectives focus on the application of that knowledge
  - *Ex: Perform a primary survey in a trauma simulations*
  - *Ex: Evaluate the completeness of the primary survey (by the other cohort of students)*

REMEMBER	UNDERSTAND	APPLY	ANALYZE	EVALUATE	CREATE
List, Name, Identify, Show, Define, Recognize, Recall, State, Visualize	Summarize, Explain, Interpret, Describe, Compare, Paraphrase, Differentiate, Demonstrate, Classify	Solve, Illustrate, Calculate, Use, Interpret, Relate, Create, Manipulate, Apply, Modify	Analyze, Organize, Deduce, Contrast, Compare, Distinguish, Discuss, Plan, Devise	Evaluate, Choose, Estimate, Judge, Defend, Criticize	Design, Hypothesize, Support, Schematize, Write, Report, Justify
lecture, visuals, video, audio, examples, illustrations, analogies	questions, discussion, review, test, learner presentation, writing	exercises, practice, demos, projects, sketches, simulation, role play	problems, exercises, case studies, critical incidents, discussion	case studies, critiques, appraisals	projects, develop plans, construct simulations, creative exercises
RECALL & RECOGNITION		APPLICATION & PROBLEM SOLVING			

Take one or two objectives from a class you are currently teaching and try to write 1-2 lower order and 1-2 higher-order objectives:

Lower Order Objectives

Higher Order Objectives

Part 3. Use Sound Theory to Create Your Lessons

These principles of e-Learning championed by Richard Mayer have been shown to improve learner learning when material is presented in a digital format. For a good summary on this subject, I refer you to Ruth Clark and Richard Mayer, E·Learning and the Science of Instruction, 3rd edition, Pfeiffer Publishing, August 16, 2011.

Avoid bullet points and useless images
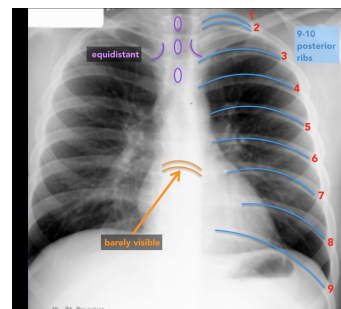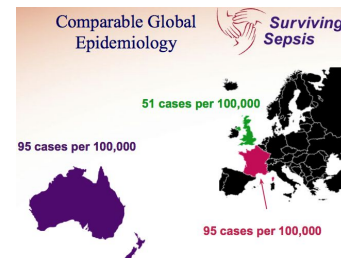
Replace with relevant images

Richard Mayer's Multimedia Learning Principles

People learn better...	
What Material To Include	
Multimedia	...from words and pictures than from words alone
Modality	...from graphics and narrations than from animations and on-screen text
Redundancy	...from graphics and narration than from graphics, narration & on-screen text
Coherence	...when extraneous words, pictures & sounds are excluded
Arranging The Material	
Contiguity	...when corresponding words & pictures are presented next to each other and simultaneously
Pre-training	...when they know the names and characteristics of the main concepts ahead of time
Signaling	...when cues that highlight the organization of the essential material are added
Segmenting	...when material is presented in user-paced segments rather than a continuous unit
Voice & Personalization	
Personalization	...when words are in a conversational style rather than a formal style
Voice	...when narration is spoken in a friendly human voice rather than a machine voice
Image	...when the speaker's image isn't on the screen (distracting from the material)

If you want to learn more about the theory behind these principles, here's a short video:
youtu.be/BcWSUnXz8kw
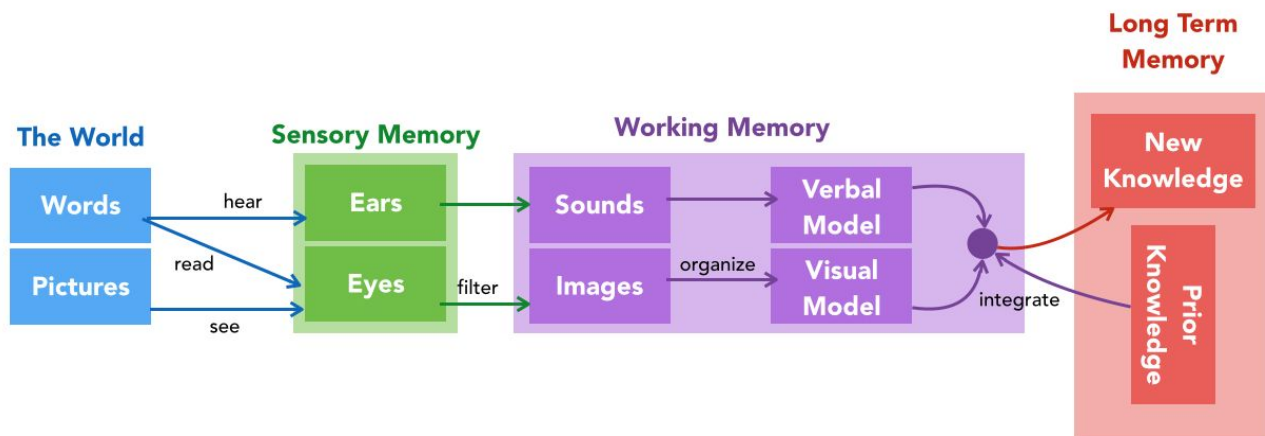
Practice by redesigning slides of your own using these principles.

Part 4: Take Care With Images

There are two dangers lurking when using images: copyright law and HIPAA. Most pictures obtained through an Internet search engine are often not licensed for reuse and put you in potential copyright trouble. There are, though, many resources where you can get images for reuse.
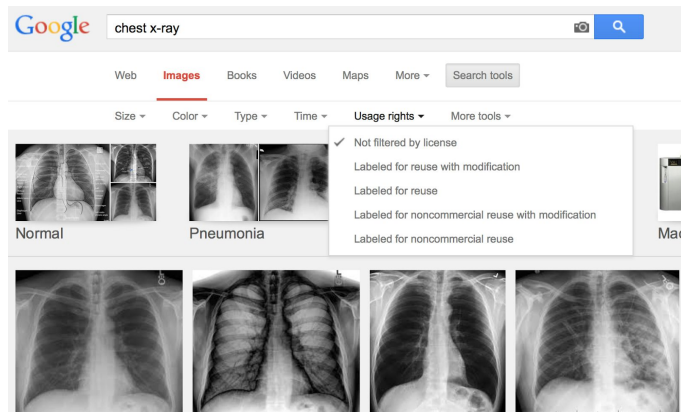

Putting "chest x-ray" into a Google Image search yields mostly pictures which shouldn't be reused. By selecting "Search Tools" > "Usage Rights," the search can be further refined to include those graphics ready for reuse. Most are supplied under a Creative Commons license which gives people "a simple, standardized way to grant copyright permissions to their creative work."

Another good source of images available for reuse is WikiMedia Commons (part of the same organization as Wikipedia). This site is full of many high quality medical images provided for public reuse (with proper attribution).

Alternatively, you can take your own images. Be sure to follow a few rules:

Information outside the cropped area remains in the file and can be easily recovered.

● Don't use patient information without a consent
● Remove any personal health information. Simply cropping (or masking) out the patient's name and saving an image keeps all the information with the picture. It is a simple matter to "uncrop" the image and reveal the identifying information. Information may also be saved in the meta-data (EXIF). Search your image manipulation software's documentation for the correct way to *destructively* edit the photo (no original information is saved) and remove meta-data.
● Alternatively, you can create your own images with drawing programs like Photoshop or Pixelmator (bitmap image software) or Illustrator or iDraw (vector editing software).
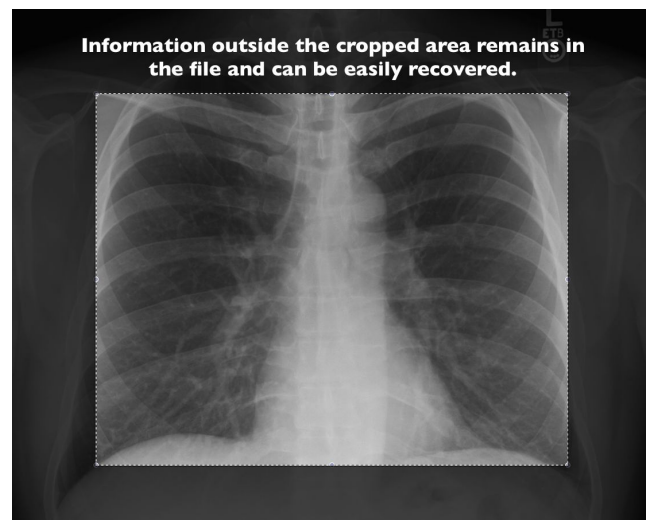
1. commons.wikimedia.org
2. www.flickr.com
3. phil.cdc.gov/phil/home.asp
4. images.google.com using Search Tools to find images labeled for re-use

## Tip 5: Create resources with familiar technology (making home modules)

At home modules can be anything from assigned readings to a print out of your slides but today's learners appreciate and can benefit from video lessons. However, do not make the mistake of simply recording yourself giving your lecture. There are options for creating your own content.

Hardware	Create Content	Screen Recorders	Video Editing Software	All-in-One Options
Microphones - Samson Meteor - Blue Snowball - Blue Nessie - Built-in microphone Drawing Tablets - Wacom Bamboo	PowerPoint / Keynote (has recording capabilities built-in) Drawing Programs (Paint, Illustrator, SketchUp)	Camtasia Snagit Screenr Screencast-o-matic Quicktime (Mac) ScreenFlow (Mac) iShowU HD Pro (Mac)	ScreenFlow (Mac) Windows Movie Maker iMovie / Final Cut Pro (Mac)	Knowmia Doceri EduCanon Socrative Explain Everything (iPad / Android) DoodleCast Pro (iPad) Vittle (Free version available)
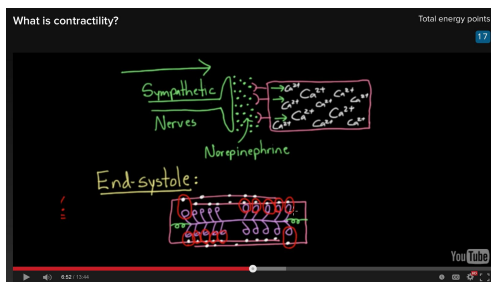
The classic example of the flipped classroom comes from the Khan Academy (see picture to the left). What does it take the create content on this level? Sal Khan uses a Wacom Graphic tablet and stylus, headphones with a built-in boom microphone, and would record in his closet.

Peter Norvig and Sebastian Thrun, creators of one of the first immensely popular MOOC's in Artificial Intelligence used only a pen, paper and camera.
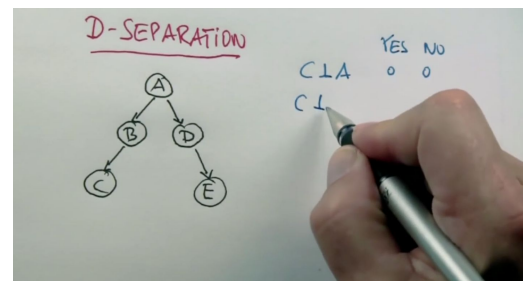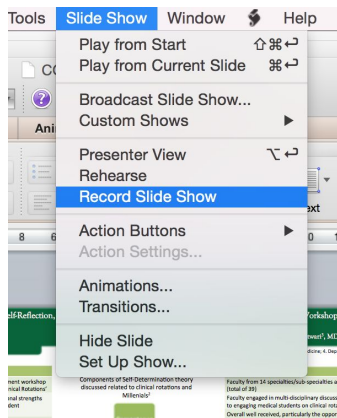
To get started, it's best to use the software with which you are already familiar. In PowerPoint, after creating your slides using the Multimedia principles, you'll go to the "Slide Show" menu and select "Record Slide Show." Then you can start recording and speak your presentation while you advance the slides. Your built-in microphone (or attached microphone if you have one) will record your voice. The video comes from the screen.

When you are done, pick the X labeled "End Show." From the File menu, you can pick "Save as Movie…"
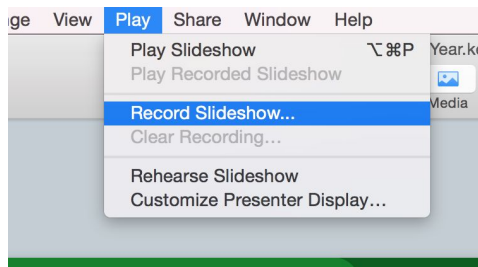
In Keynote, you'll do something similar. After your slides are completed, select "Record Slideshow…" from the Play menu. Go through your slides, while narrating, and the microphone will record your voice.

To save it as a move, from the File menu select "Export" and choose "Quicktime…"

Go ahead and give that a try.

## Tip 5.5: Upload your Modules to the Public Domain

Putting your material in the public domain has several benefits:

1. It allows for easier access by learners on various devices
2. It allows learners outside of your institution to also benefit from your material (participate in Free Open Access Medical Education: FOAMed).
3. Instructors from other institutions can incorporate your materials into their teaching, thus broadening your impact. It demonstrates international adoption of your teaching materials (often with testimonials to include in your promotions packet).
4. Let the big websites handle the streaming, storage and video & comment management

To the right, you can see the analytics for a FlippedEMClassroom.wordpress.com. As of April 2015, when this screenshot was taken, the site was accessed around the globe.
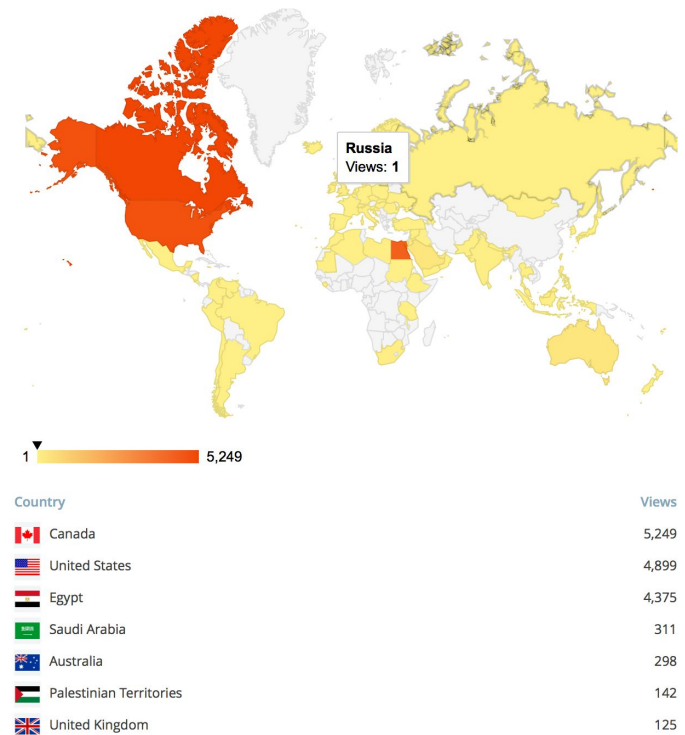
Some commonly used public repositories include: For videos:
- YouTube (www.youtube.com)
- Vimeo (www.vimeo.com)

For written materials
- MedEd Portal (www.MedEdPortal.org) Your own website or blog
- WikiSpaces Education (www.WikiSpaces.com)
- WordPress (www.wordpress.com, www.wordpress.org) o Weebly (www.weebly.com)
- SquareSpace (www.SquareSpace.com)

Stats for 2015

Russia
Views: 1

1 ▼ 5,249

Country	Views
Canada	5,249
United States	4,899
Egypt	4,375
Saudi Arabia	311
Australia	298
Palestinian Territories	142
United Kingdom	125

Part 6: Design Classroom Activities

Begin the class by using a focusing activity. This tasks the learners with using the background materials. Some possible ideas:

- Ranking
- Question and Answer time
- Think-pair-share
- Identify 1 confusing point
- What if?

Then move on to the main classroom activity. These should explore Bloom's higher domains such as application, analysis, evaluation and creation, and synthesis. The objectives should build upon the core knowledge learned from the home modules. Try to bring the lesson home and into the clinical realm.

Here are some examples:
- **Application**: table top case scenarios and simulation
- **Analysis**: debate over controversies or journal articles, comparing diagnostic and treatment strategies, analyze the quality of a case management (from M&M or even a television show)
- **Creation**: have learners create and role play scenarios involving patients, family members, physicians and other health care team members for difficult conversations

Allow the content to guide you. Support experimentation. For example, learning procedures should allow students to get out the simulators during class time. Using common tools (e.g., slit lamp) will need additional resources. In general, discussion is a good place to start. The conversational style is low risk and learners love the time to interact with each other and the teachers. Branch out from here. Common themes include mind-mapping, content creation, projects, small group work, etc.

Instruction is shifted from instructor-focused to learner-centered. Let learners lead the discussion as much as possible, ask questions of one another and teach one another. Teachers adopt a supportive, but far from passive role. The instructor's job is to:

1. Design activities that promote discussion between members of the group
2. Help initiate discussion with probing, open-ended questions. Ask learners to:
   a. Explain or elaborate their ideas,
   b. Provide the rationale for their decisions,
   c. Ask for alternative methods to approach the problem,
   d. Link these concepts to previous material by creating a concept map
   e. Reflect on how well the group is completing the assignment predict outcomes, or
   f. Generate hypotheses.
3. Provide feedback when learners are going off track or quiet
4. Continually observe and make adjustments as appropriate.

Will the learners really teach each other? If learners attained the foundational knowledge outside of class and the classroom activity is properly created, there is usually spontaneous participation. When this happens, the instructor can simply step out of the way and observe. You become "the guide on the side" instead of the traditional lecturer role of "sage on the stage" (King 1993). As Dr. Eric Mazur said in his "Confessions on a Converted Lecturer" talk, our job should "shift [the] focus from teaching to helping learners learn."

Dr. Stephanie Velegol Professor of Environmental Engineering from Penn State flipped her classes and following this paradigm:

PRIMING	VIDEOS	PRE-SESSION ASSESSMENT	IN CLASS EXERCISES	WEEKLY QUIZ

1. **PRIMING:** Give students an activity to draw upon the knowledge they already possess. Ask them to solve a problem before you have taught them how. This brings their prior knowledge to the foreground so they can hook new material into it.
2. **VIDEOS:** She designed short videos using the material she had already created. Students would watch these at home.
3. **PRE-SESSION ASSESSMENT:** Students would answer a short quiz at home after watching the videos. By having students answer questions on the video, she appealed to their extrinsic motivation (a small number of points toward their grade) to ensure they watched. Additionally, the last question was "what was the point you least understood?" (muddiest point). After reviewing all the student's answers, she would dedicate a few minutes at the beginning of class to clear up misconceptions the whole group had.
4. **IN CLASS EXERCISES:** Class time was dedicated to students going through the homework. They could work together or alone. If they run into trouble, they have the benefit of having the instructor right there to answer questions. Attendance was not mandatory at these sessions (some students study better at home in quiet), but she found usually these were well attending.
5. **WEEKLY QUIZ:** At the end of each week, students had a quiz on the material to assess their level of mastery. Students had to achieve a level of 75% or higher. If they failed to do so, there was no penalty. Students were directed back to the videos and homework to re-learn what they got wrong. They could reattempt the quiz as many times as needed to achieve the passing score. This ensured all students achieved the same level of mastery.

Eric Mazur, Professor of Physics at Harvard University, champions peer learning in his classroom. While not technically a flipped classroom, this technique lends itself well to in class activities.
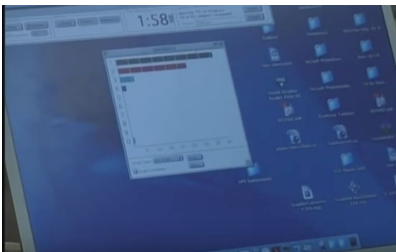

He first teaches a concept, using a combination of slides and demonstrations.

He then challenges his students with a question to answer using the concepts he just taught. They do this separately answering using an audience response system.
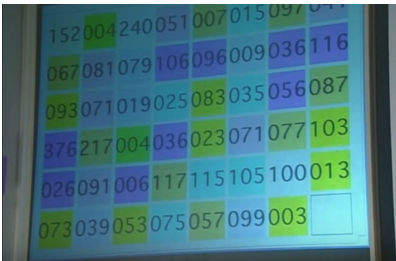
Once all students have answered,

and he has tallied their responses,

he encourages them to teach each other. Dr. Mazur notes that the expert is not in the best position to teach novices. The depth of our knowledge prevents us from appreciating the difficulties that those new to the material face. Peers, on the other hand, are best suited to teach each other.

He circulates through the class and clarifies points as well. However, this discussion is entirely student run. The classroom is fairly loud at this point.

Finally, once everyone has answered, he reviews the concepts again. If you're interested in learning more about his technique, here are two excellent videos:
- Peer instruction (8 minutes): https://www.youtube.com/watch?v=wont2v_LZ1E
- Confessions of a Converted Lecturer (1 hour): https://www.youtube.com/watch?v=WwslBPj8GgI

Of course, these are just two of many ways to run your in class sessions. Try to let the students have autonomy to discuss, teach and explore. Step in only when they deviate greatly from the path or ask for help. "Be the guide on the side instead of the sage on the stage."

Part 7: Enhancing Learner Motivation

There are two types of motivation: external and internal. Students who are responding to external motivators are driven by achieving rewards or avoiding penalties. This is our typical method of motivating students: grades in class or on boards. This will still play a role as we still need to give grades.

Internal motivation is a deeper stimulus. It comes from within. There are several models of self-motivation, the overlap boils down to these four principles.

Mastery / Competence	Purpose	Relatedness / Support	Autonomy

The flipped classroom allows students to achieve each of these needs.

1. **MASTERY & COMPETENCE:** students are driven by the knowledge that they can do well. They can pause and rewind lecture videos until they understand a concept instead of getting lost in a lecture that plods forward without them. Mastery learning techniques ensure students do not progress until they achieve a level of competence.
2. **PURPOSE:** they need to see the value in what they are doing. The more an activity relates to what they would use in real-life, the more value is placed on the activity. For us, this translates to patient care. We can design genuine activities that mimic the day-to-day activities of a physician through cases, simulation or other activities.
3. **RELATEDNESS & SUPPORT:** Students are better motivated when they feel part of the team. Students teach each other in class. They can approach the instructor to give them individual focused attention where they are having trouble.
4. **AUTONOMY:** Students are better motivated when they have some degree of control of over their learning. With video lectures they are able to control how, when and where they learn the material. In class, students run the discussion.