



UNC  
SCHOOL OF MEDICINE

# Academy of Educators Community Conversations

**September 24, 2018**

**sanofi-aventis Conference Room**

**NC Cancer Hospital**



UNC  
SCHOOL OF MEDICINE

ACADEMY *of*  
EDUCATORS

# Updates from the President



# Meet Your Council

- Gary Beck Dallaghan
- Jason Crowner
- Benny Joyner
- Susie Martinelli
- Christina Shenvi
- Lindsay Wilson
- Eric Zwemer



# Committee Overview

- **Scholarship Committee**
  - » Increase scholarly output
  - » Improve the learning environment
- **Programming Committee**
  - » Improve visibility and perceived value of the Academy through high yield programming
- **\*\*Sign the committee interest paper being circulated, or email [aoe@med.unc.edu](mailto:aoe@med.unc.edu) to express interest in joining one of these committees**

# The Flipped Classroom in Medical Education

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University of North Carolina

September 24, 2018



THE UNIVERSITY  
*of* NORTH CAROLINA  
*at* CHAPEL HILL

# Disclosures

Foundation for Anesthesia Education and  
Research: Research in Education Grant  
2014-2016

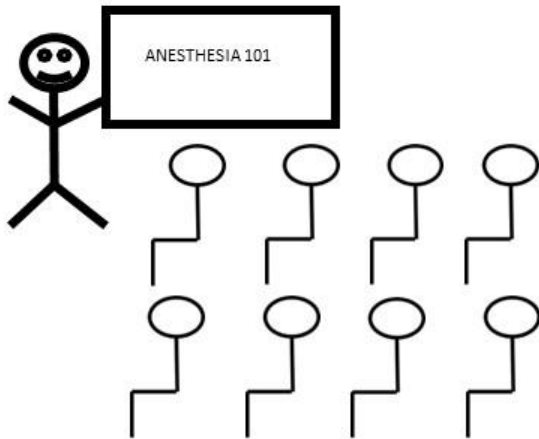


# Objectives:

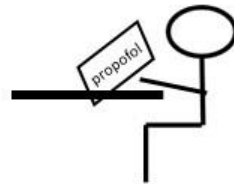
- Components of flipped classroom
- Evidence surrounding flipped classroom
- Implementing flipped classroom

## TRADITIONAL CLASSROOM

### 1. Lecture



### 2. Homework

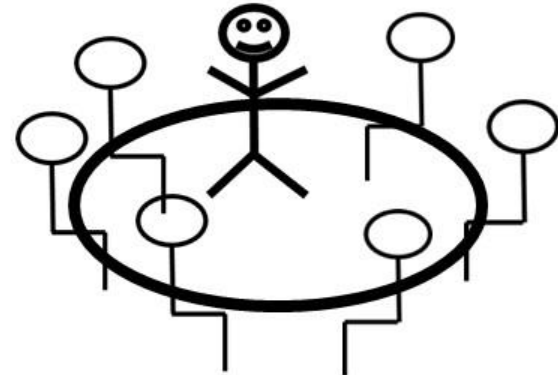


## FLIPPED CLASSROOM

### 1. Lecture



### 2. In Class Session



# Suggested benefits of FC

- Efficient
- Flexible
- Student autonomy
- Personalized learning strategies
- Engaging
- Promotes life-long learning
- Team work
- Assess understanding
- ↑ knowledge gain
- ↑ knowledge retention

# Concerns with FC

- Time intensive
- Preclass align with in class/objectives
- Some in class techniques inefficient
- Students dominating in class session
- Facilitators must be good
- Students unable to ask questions immediately
- Students must be motivated

Ramnanan & Pound. Advances in medical education and practice: student perceptions of the flipped classroom. Adv Med Educ Pract. 2017 Jan 13;8:63-73.

Sait et al. Advances in medical education and practice: student perceptions of the flipped classroom. Adv Med Educ Pract 2017 May 2;8:317-320.

Kheng Guan Toh | Dreamstime.com

# Pharmacy studies

- Wong et al
  - 3 sessions on cardiac arrhythmias
  - ↑knowledge gain (2 of 3)
- McLaughlin et al
  - Entire pharm course
  - ↑knowledge gain
- Pierce et al
  - 8 week renal pharm course
  - ↑knowledge gain



# Systematic review of FC in Medical Education



- 46 articles
  - 11 GME
  - 9 controlled studies—none in GME
- Outcomes
  - ↑ satisfaction with FC
  - Mixed results with knowledge/skill

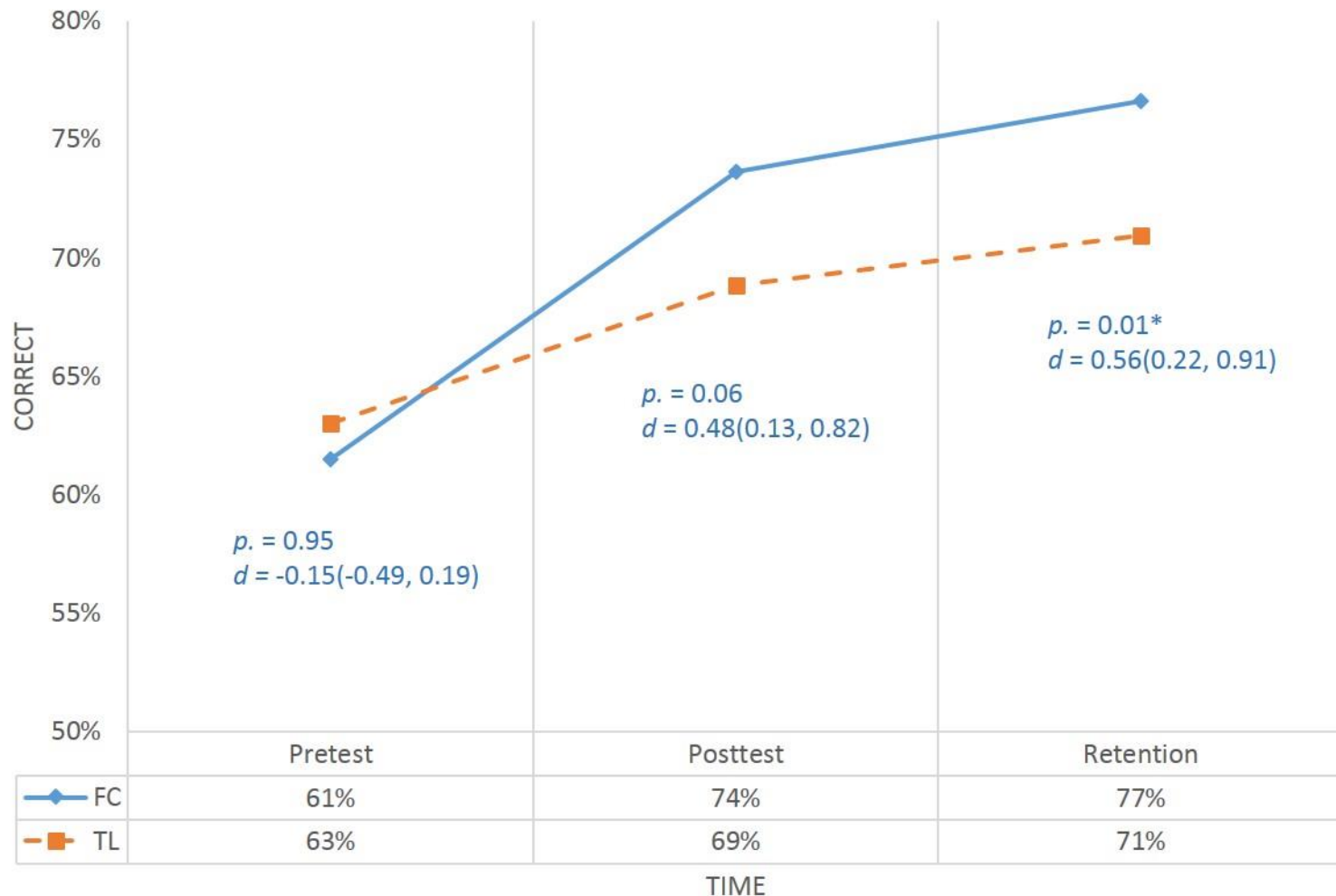
Chen F, Lui AM, Martinelli SM. A Systematic review of the effectiveness of flipped classroom in medical education. *Medical Education*. 2017

# Anesthesia Basic Board Preparation Experience

- 155 PGY-2s
- 8 institutions
  - Either TL or FC
- Multiple choice knowledge tests
- Preferred FC ( $p < .001$ )

Martinelli SM, Chen F, DiLorenzo AN, Mayer DC, Bowe EA, Fairbanks S, Hendrickse A, VanDyke K, Trawicki MC, Moran K, Rankin D, Guldan GJ, Hand W, Gallagher C, Jacob Z, Ku C, Mitchell JD, Royal KD, McEvoy MD, Zvara, DA, Schell RM. Flipped classroom led to increased knowledge acquisition and retention and is strongly preferred to traditional classroom in anesthesiology residents. Journal of Graduate Medical Education 2017.

# Adjusted means of the percent correct on the knowledge test over time

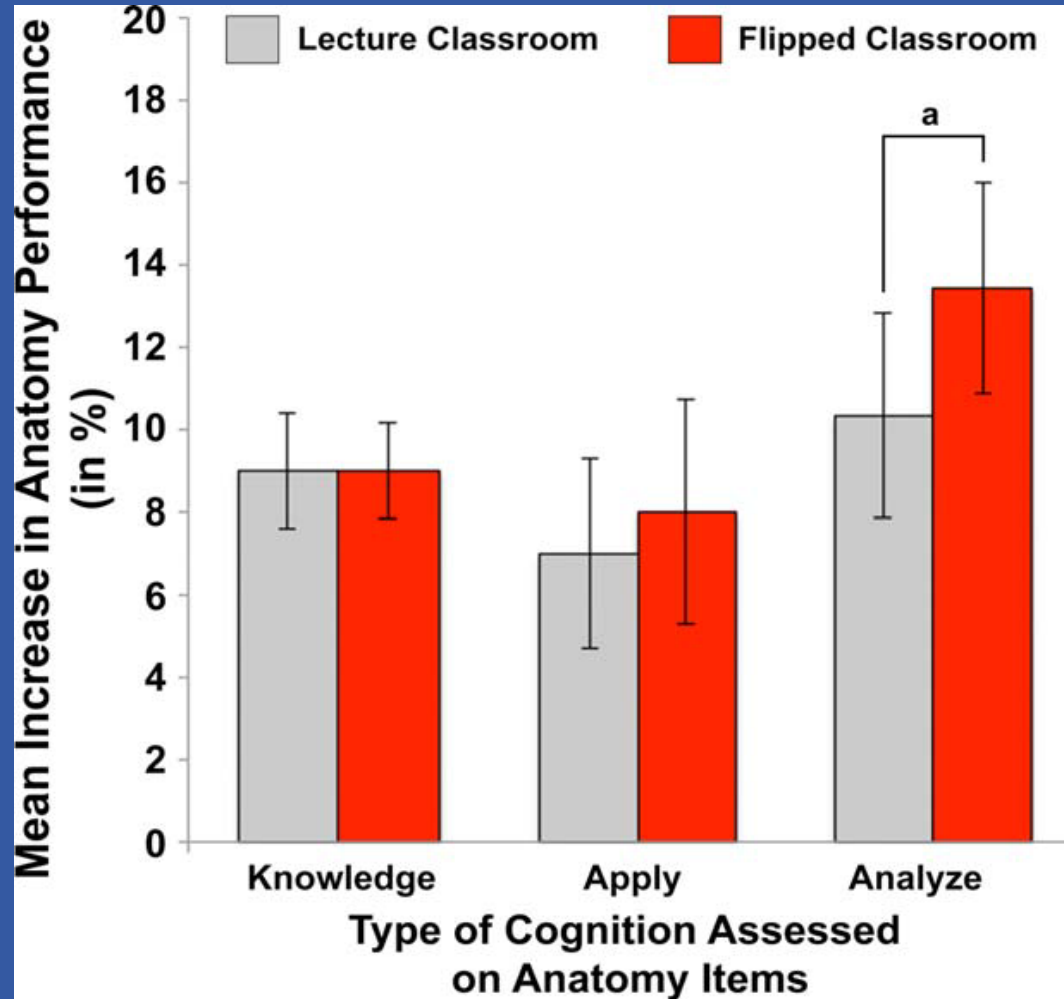


# Graduate Medical Education

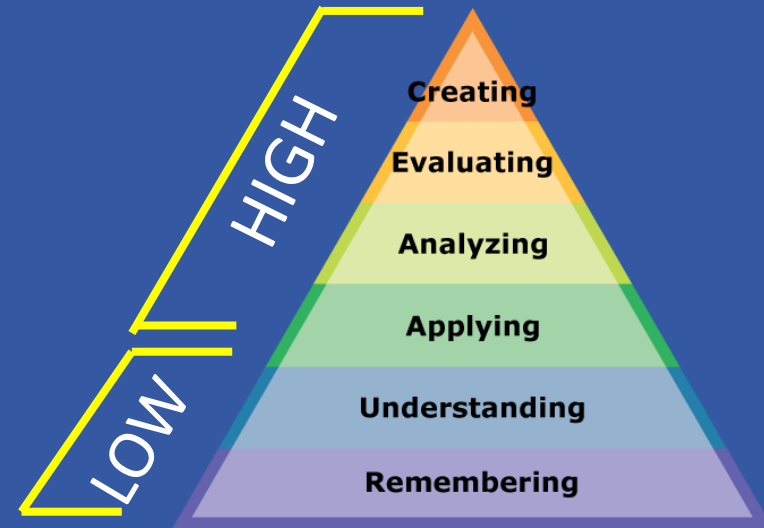
- Internal Medicine—Quality improvement<sup>1</sup>
  - ↑knowledge gain
  - Preference for FC
- Emergency Medicine—ED complaints<sup>2</sup>
  - Equivalent knowledge gain
- Neurosurgery—board prep<sup>3</sup>
  - ↑board scores
  - Preference for FC

1. Bonnes SL, et al. Flipping the quality improvement classroom in residency education. *Acad Med* 2017 Jan; 92(1): 101-107.
2. Riddell et al. Does the flipped classroom improve learning in graduate medical education? *J Grad med Educ* 2017 Aug;9(4): 491-496.
3. Girgis F, Miller JP. Implementation of a “flipped classroom” for neurosurgery resident education. *Can J Neurol Sci.* 2018; 45(1): 76-82.

# Impact of FC based on Bloom's Taxonomy



VS



[http://www.learnnc.org/lp/media/misc/2008/blooms\\_new.png](http://www.learnnc.org/lp/media/misc/2008/blooms_new.png)

Morton DA, Colbert—Getz JM. Measuring the impact of the flipped anatomy classroom: the importance of categorizing an assessment by Bloom's Taxonomy. *Anat Sci Educ*. 2017 Mar; 10(2): 170-175.

# Would testing with OSCEs show a greater difference?

- OB GYN MS clerkship

## Multiple Choice Examination

		Traditional	Flipped	P value
Rotation 2	OB	52%	59%	0.03
Rotation 3		64%	67%	0.247
Rotation 2	GYN	58%	68%	0.0017
Rotation 3		75%	65%	0.00011

Gillispie. Using the flipped classroom to bridge the gap to generation Y. Ochsner Journal 2016 16:32-36.

# Would testing with OSCEs show a greater difference?

- OB GYN MS clerkship  
**OSCE Examination**

		Traditional	Flipped	P value
Rotation 2	OB	74%	82%	0.0198
Rotation 3		70%	82%	0.0076
Rotation 2	GYN	71%	84%	0.006
Rotation 3		67%	81%	0.0052

Gillispie. Using the flipped classroom to bridge the gap to generation Y. Ochsner Journal 2016 16:32-36.



<https://i.ytimg.com/vi/ZRvmjjeZ9CA/maxresdefault.jpg>

# Implementation of FC

1. Pre-session homework
2. In class session

# Implementation of FC

## 1. Pre-session homework

- Often video 15-20 min
- Voice over slide based presentation
- Ensure learners know expectations

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# Example of Pre-class “Homework”

# Pacemakers and ICDs in the Operating Room

Susan M Martinelli, MD  
Advanced Board Prep  
Preclass Video  
April 2017

# Tips for Making Videos

- Words and pictures concurrently
- Follow learning objectives
- Minimize irrelevant information
- Keep short or break into short segments
- Use already made video
  - Quality
  - Credible source
- No consensus if lecturer should be seen

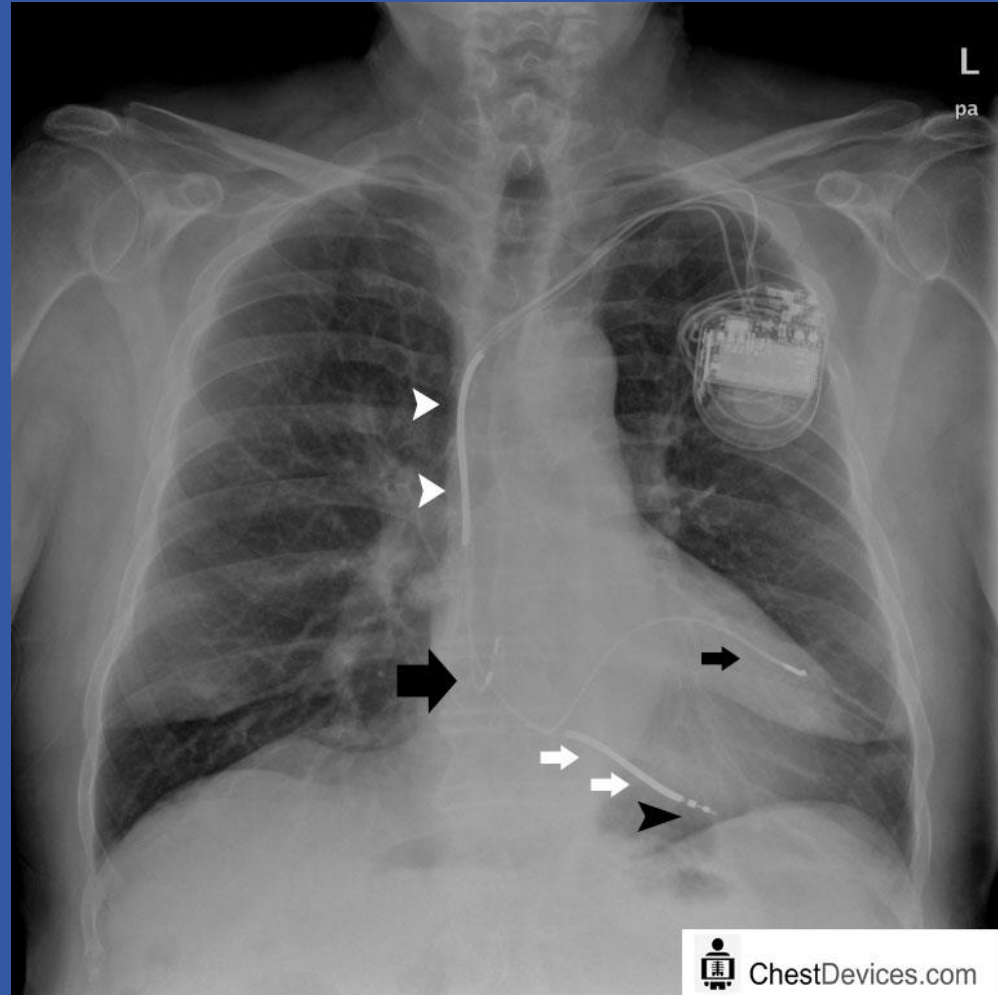
# Implementation of FC

## 2. In class

- Active learning
- Problem solving
- Function as facilitator/coach

# Example of In Classroom Learning

- What device is this?
- Where are the leads going?



You are offsite doing colonoscopies. The next patient has a cardiac implantable electronic device. Cardiology is not available to reprogram the device. You:

- A. Cancel the case and send them to the main OR
- B. Do the case if it is a PM
- C. Do the case if it is an ICD
- D. Do the case regardless of the type of device

# In Classroom: Active Learning



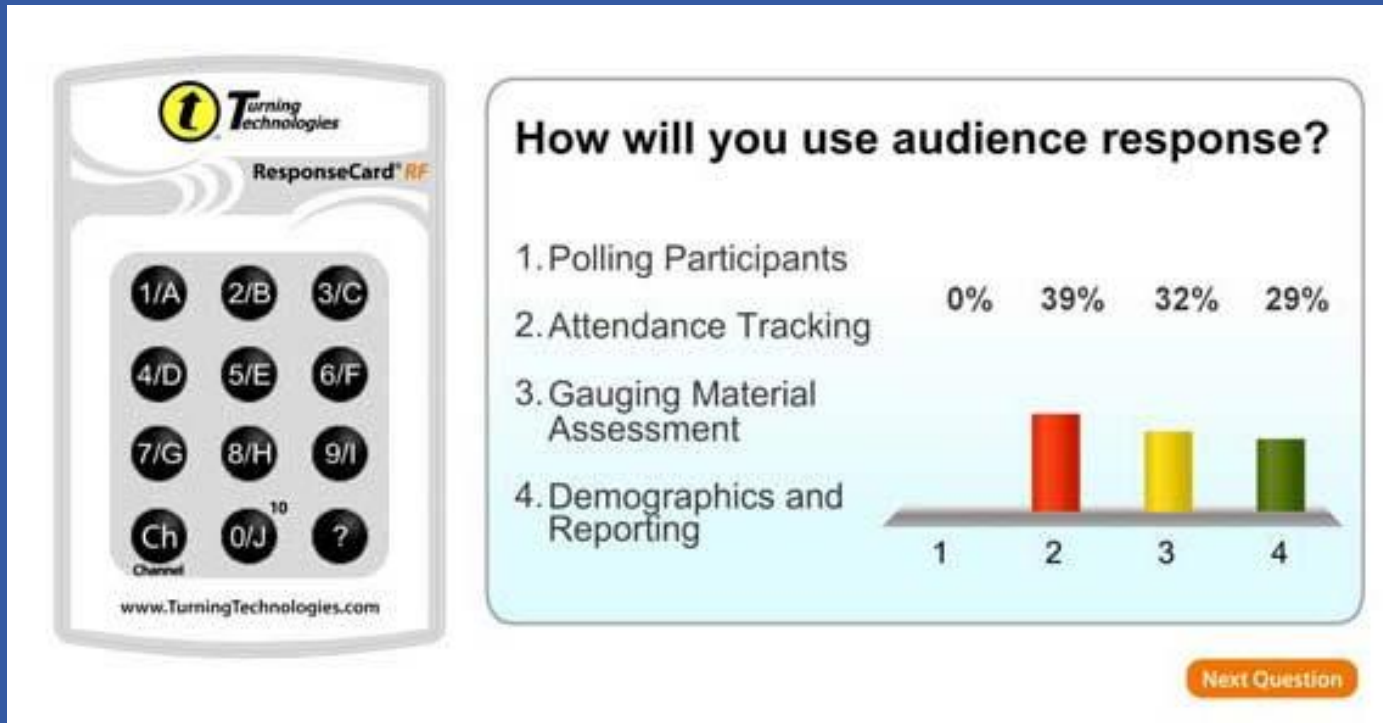
# In Classroom: Active Learning

- Audience response questions



# In Classroom: Active Learning

- Audience response questions



# In Classroom: Active Learning

## •Audience response questions

### 1. Ask a question

Create polls with our  
[simple poll editor](#)

**Question**  
Ask "What is your favorite color" with

**What is your favori**

**Options**

Drag Me Red

Drag Me Blue

Drag Me Green

Add an Option

Save new poll or [cancel creating poll](#)

### 2. The audience votes

via mobile phone  
or [on the web](#)

Compose SMS

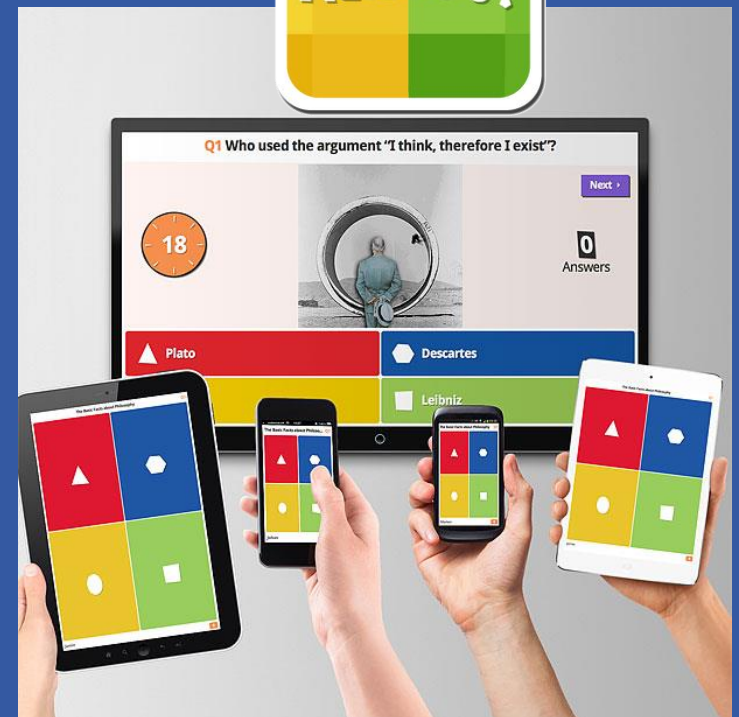
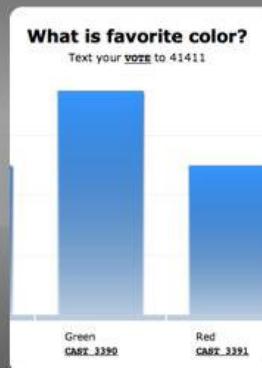
To: 41411

Message: CAST 1008

[SEND]

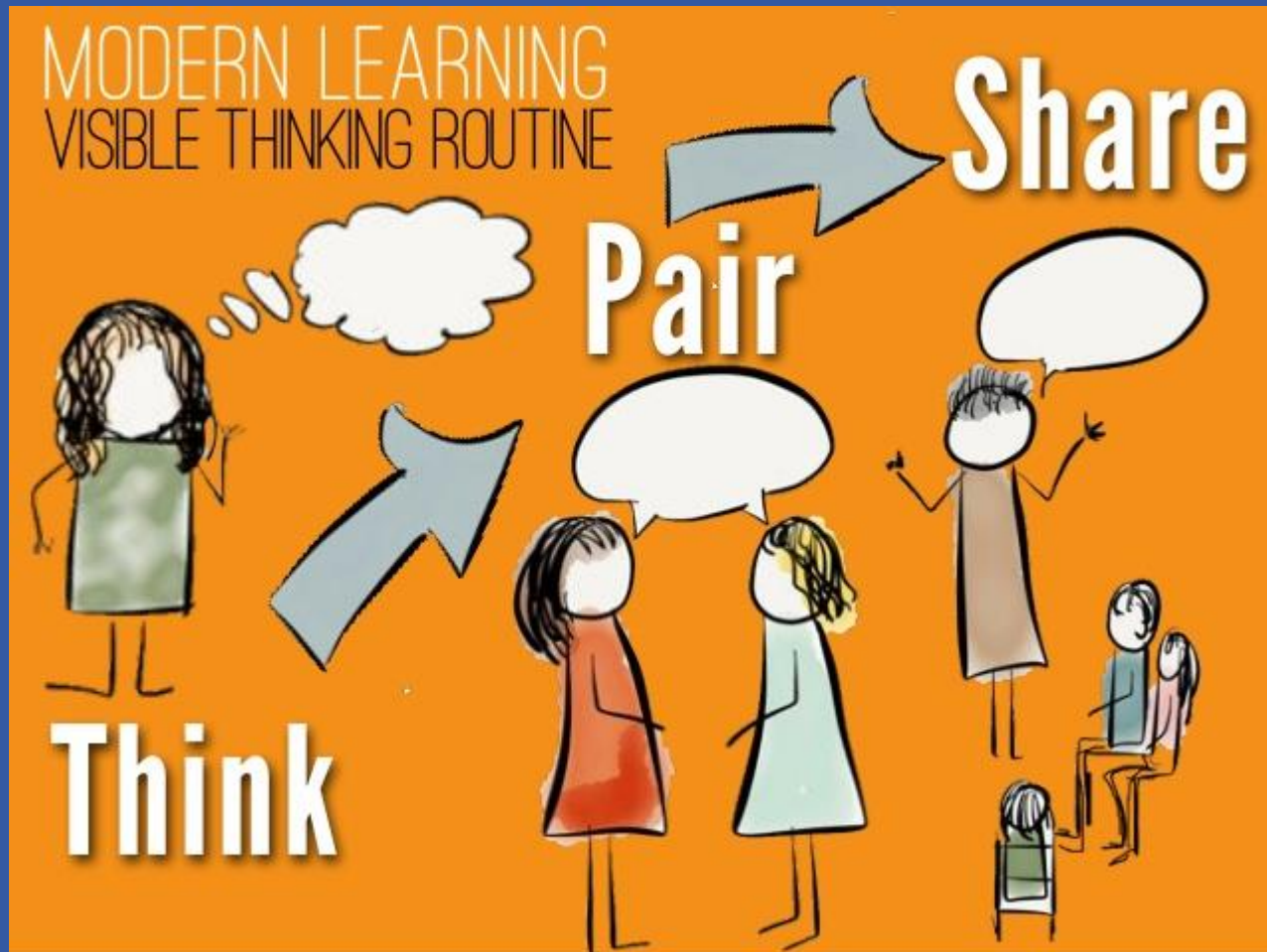
### 3. Show results

Charts update live in PowerPoint  
or your browser as people vote



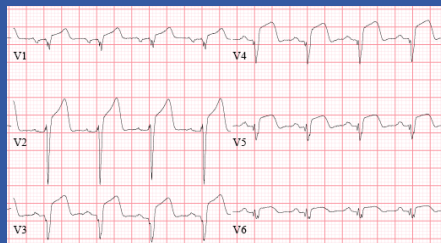
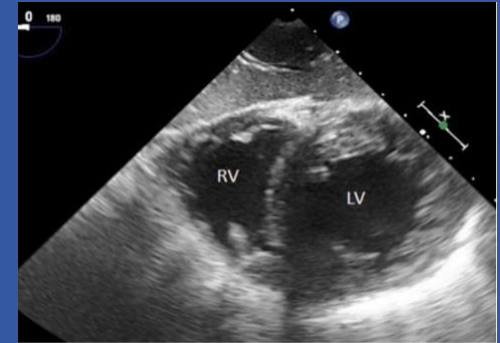
# In Classroom: Active Learning

- Think pair share



# In Classroom: Active Learning

- Case based learning



COMPLETE BLOOD COUNT			
EXAM NAME / COMPONENTS		RESULT UNITS	NORMAL VALUES
WBC COUNT		7.45 $10^3/uL$	4.5 - 11 $10^3/uL$
Neutrophil		57.1 %	50 - 70 %
Lymphocytes		36.2 %	20 - 40 %
Monocytes		4.1 %	2 - 8 %
Eosinophils		3.6 %	2 - 8 %
RBC COUNT		5.2 x $10^6/uL$	4.6 - 6.2 x $10^6/uL$
HGB Hemoglobin		15.6 g/dL	13.5 - 18 g/dL
HCT Hematocrit		44.5 %	40 - 54 %
MCV Mean Cell Volume		95.3 fL	80 - 100 fL
MCH Mean Corpuscular Hgb.		30 pg	27 - 32 pg
MCHC Mean Corpuscular Hgb. Conc.		33.5 g/dL	31 - 35 g/dL
RDW RBC Distribution Width		12.8 %	11.6 - 13.7 %
Platelet		271 x $10^3/uL$	150 - 400 x $10^3/u$
MPV		8.8 fL	7.8 - 11 fL

- Educational games



COSMOLOGICAL	PLACES	T.V. SHOWS	MEDICAL TRIVIA	MILITARY AND WAR	SCIENCE
\$100	\$100	\$100	\$100	\$100	\$100
\$200	\$200	\$200	\$200	\$200	\$200
\$300	\$300	\$300	\$300	\$300	\$300
\$400	\$400	\$400	\$400	\$400	\$400
\$500	\$500	\$500	\$500	\$500	\$500

# In Classroom: Active Learning

- Role play



# What do the faculty think?



# Faculty Survey Regarding FC

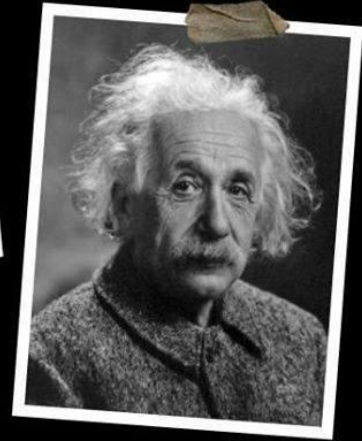
- 244 faculty
- 57% understood FC
  - 57% used FC in previous year
- Perceived barriers
  - Learners prepared
  - Learners participation
  - More comfortable with TL
  - Time to prepare
  - Technology
- 89% interested in faculty development

Martinelli SM, Chen F, McEvoy MD, Zvara DA, Schell RM. Utilization of the flipped classroom in anesthesiology graduate medical education: a survey of faculty beliefs and practices. [J Educ Perioper Med](#). 2018 Jan-Mar; 20(1): E617.

# Conclusions

- Learners prefer FC
- Knowledge benefit
- Limited work in GME

**"Education is not  
the learning of  
facts, but the  
training of the mind  
to think."  
-Albert Einstein**



- Barriers—improve with faculty development?
- Component of multi-modal curriculum

# Closing Thoughts

## Reminder to RSVP:

Frank Wilson Professionalism Forum

October 17, 2018

Workshop – 12:00 - 1:00PM

Bondurant 2020

Reception & Evening Lecture – 4:30 - 6:00PM

Bondurant G100

