The background of the slide features a close-up photograph of several books stacked vertically. A yellow spiral-bound notebook is placed on top of the stack. The lighting is dramatic, with strong highlights and shadows, creating a warm, academic atmosphere.

Rethinking Assessment Strategies in the Basic Sciences as Step 1 Goes Pass/Fail

David M. Harris, PhD
Associate Professor of Physiology
University of Central Florida College of Medicine





Dr. Zagaar: “Changes to USMLE are an opportunity to innovate”

COGNITIVE INTEGRATION! – Dr. Daniel

The Team:

Christine Kauffman, MD

Jon Kibble, PhD

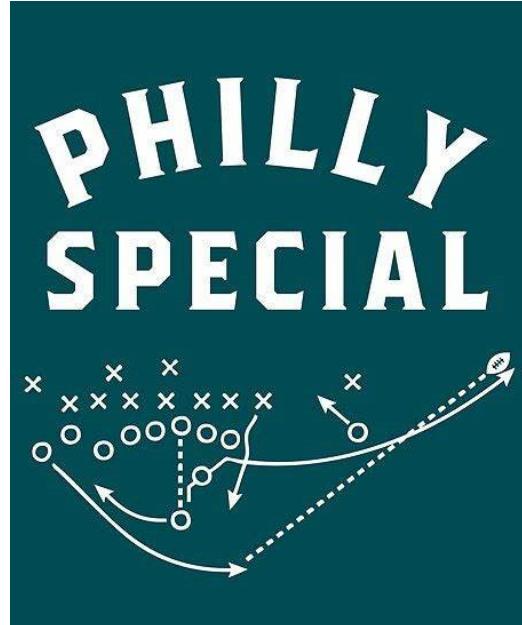
Dario Torre, MD, PhD

Steve Lambert, PhD

Nyla Dil, PhD

Jeff LaRochelle, MD MPH

Liz Ivey



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Objectives

- 1. Outline the need for assessment changes in our curriculum**
- 2. Describe changes in the context of the UCF Curriculum in the following in response to USMLE Step 1 going P/F:**
 - a. concept mapping**
 - b. high fidelity patient simulation**
 - c. team based learning**
- 3. Discuss obstacles and barriers of changing assessment in the context of a curriculum**



Disclosures

- 1. I do not consider myself an expert in assessment.**
- 2. I believe that you have to adjust according to your school context/culture**
- 3. I am not afraid to take risks.**
- 4. I do serve as a basic science lead for the Aquifer Sciences Initiative, a collaboration between IAMSE and Aquifer**





Curriculum Schematic of Years 1 & 2



July	August	September	October	November	December	January	February	March	April	May	June
M1 Orientation	HB-1 Cellular Function and Medical Genetics (8 weeks)		HB-2 Structure and Function (16 weeks)		C-1 Psychosocial Issues in Healthcare (12 weeks)						
					HB-3 Health and Disease (10 weeks)	S-1 Hematology/Oncology (4 weeks)					
					Practice of Medicine including Community of Practice I						
					Focused Inquiry and Research Experience I						
M2 Orientation					Focused Inquiry and Research Experience II						
					Practice of Medicine including Community of Practice II						
	S-3 Cardiovascular and Pulmonary Systems (6.5 weeks)	S-2 Endocrine and Reproductive Systems (5 weeks)	S-4 Gastrointestinal and Renal Systems (5.5 weeks)	S-6 Brain and Behavior (8 weeks)	S-5 MSK and Skin Systems (3 weeks)	USMLE STEP 1 Dedicated Study (6 weeks)	Transition to Core Clerkships (4 weeks)	M3 Clerkships Begin			

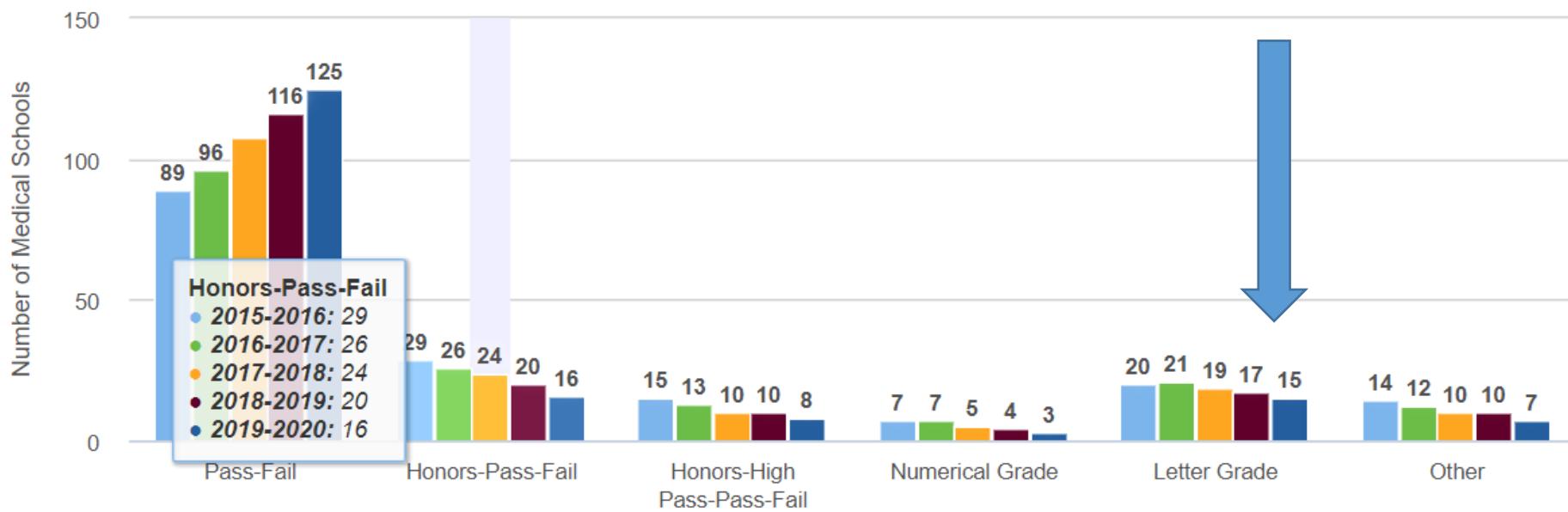
UCF has a letter grade system for the majority of M1/M2

Number of Medical Schools Using Selected Grading Systems in Pre-Clerkship Courses (Excluding Physical Diagnosis/Clinical Skills)



Please select a portion of the curriculum:

Pre-Clerkship Courses (Excluding Physical Diagnosis/Clinical Skills) ▾



Click a legend item below to add or remove a column from the report.

2015-2016
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N=142

2016-2017
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N=145

2017-2018
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2018-2019
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2019-2020
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N=153



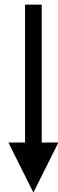
SKETCHY



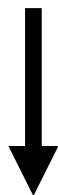
Online **MedEd**



content

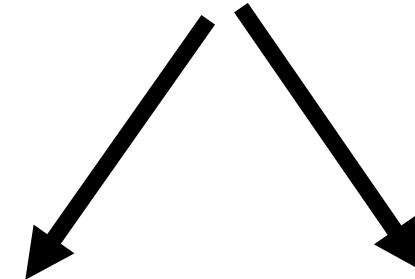


faculty

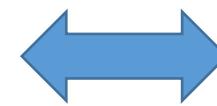


learner

content



faculty



learner

Job Roles of the 2025 Medical Educator

Deborah Simpson, PhD (@debsimpson3)

Karen Marcdante, MD (@KMarcdante)

Kevin H. Souza, MS (@KevinHSouza)

Andy Anderson, MD, MBA (@rcathird)

Eric Holmboe, MD, MACP, FRCP (@boedudley)

Box 2025 Medical Educator Job Roles

Diagnostic Assessor: Use results of big data to identify individual/group performance gaps to individualize training

Content Curator: Access, select, sequence, and deliver high-quality content developed by national experts

Technology Adopter: Be an early adopter and fluent in selecting and using appropriate technology tool(s)

Learner-Centered Navigator and Professional Coach: Guide learners' use of resources and practice to achieve identified performance targets

Clinician Role Model: Exemplar for the various 2025 physician job roles

Learning Environment Designer, Engineer, Architect, and Implementer: Designs the “space” to optimize learning informed by sciences (eg, learning)



On assessment: measure what you value instead of valuing only what you can measure.

— *Andy Hargreaves* —

AZ QUOTES

Facing Reality

Most of our assessments were MCQs

Most of MCQs target knowledge

How to balance student and faculty anxiety



Multiple Methods of Assessment Foster Inclusion

Students with disabilities and specific learning difficulties, such as dyslexia, may be disadvantaged by extensive use of particular methods of assessment, such as extended essays. Considering alternative assessment methods that measure the same or similar learning outcomes (e.g. oral presentations, posters or website designs), will ensure that students that could be disadvantaged by one assessment method have the opportunity to demonstrate their knowledge and skills by other means. An example of this is a case study from the University of Nottingham where an alternative assessment method was designed for a dyslexic student. In this example the member of staff changed the method of assessment for this student from an extended essay to a radio broadcast and supporting materials. [The full case study is available on the](#)

Facing Reality

**“Learners
need endless
feedback more
than they
need endless
teaching.”**

-Grant Wiggins, Less Teaching and More Feedback?,
ASCD Inservice,



**February 12, 2020: Step 1
changed to P/F**



Less emphasis on MCQs

*Students can hit any target
that they know about and
that stands still for them.*

~Rick Stiggins

Provide opportunities for cognitive integration

Initial Focus areas

Concept Mapping

High fidelity patient simulations

Team-based learning sessions

Case-based learning



Original Focus areas

Concept Map Exercises

High fidelity patient simulations

Team-based learning sessions

~~Case-based learning~~



Concept Map Exercises

August 2021 --- Trinucleotide repeat diseases (formative)

September 2021 – Type 1 Diabetes (summative, 5%)*

Module 1:
Cell % Molecular
Genetics

October 2021 – mitral valve stenosis (formative)

November 2021 – asthma (summative, 2%)*

December 2021 – pancreatic insufficiency (formative)

January 2022 --- Addison's disease (formative)

February 2022 -- Type 1 diabetes (summative, 2%)*

Module 2:
Structure and
Function

Learning Objectives

Terminal Objective: Given a clinical presentation, expand the concept map to illustrate the understanding of physiology concepts by building relationships between pathophysiology and clinical findings of mitral valve stenosis.

Enabling Objectives:

1. Depict the pathophysiological mechanisms underlying the peripheral and pulmonary edema in mitral valve stenosis.
2. Explain the relationship between underlying physiology and cardiac and breath sounds in mitral valve stenosis.
3. Depict the underlying physiology concepts underlying the clinical finding of dyspnea in mitral valve stenosis.
4. Illustrate the physiology of altered vital signs in mitral valve stenosis.



- Work in groups
- Faculty and educational technology facilitators
- Apply the knowledge of foundational physiology
- Save your concept map as Cmap
- Upload your map into webcourses assignment before 10 AM

Clinical Vignette

Presentation

A 47-year-old woman was brought into the hospital because of severe shortness of breath (dyspnea) and swelling in her lower legs. Over the last year she noted that she has felt short of breath while cleaning the house (exertional dyspnea). She also feels short of breath when lying down (orthopnea). The patient is awakened at night with a sensation of not getting enough air and she has to sit or stand to obtain relief (paroxysmal nocturnal dyspnea). More recently she noticed swelling of her lower extremities and increased girth and fullness of her abdomen (ascites). The swelling is worse through the day and decreases overnight. She now awakens a three to four times during the night to urinate. The patient does not remember any ill health before these problems began.

Physical Examination

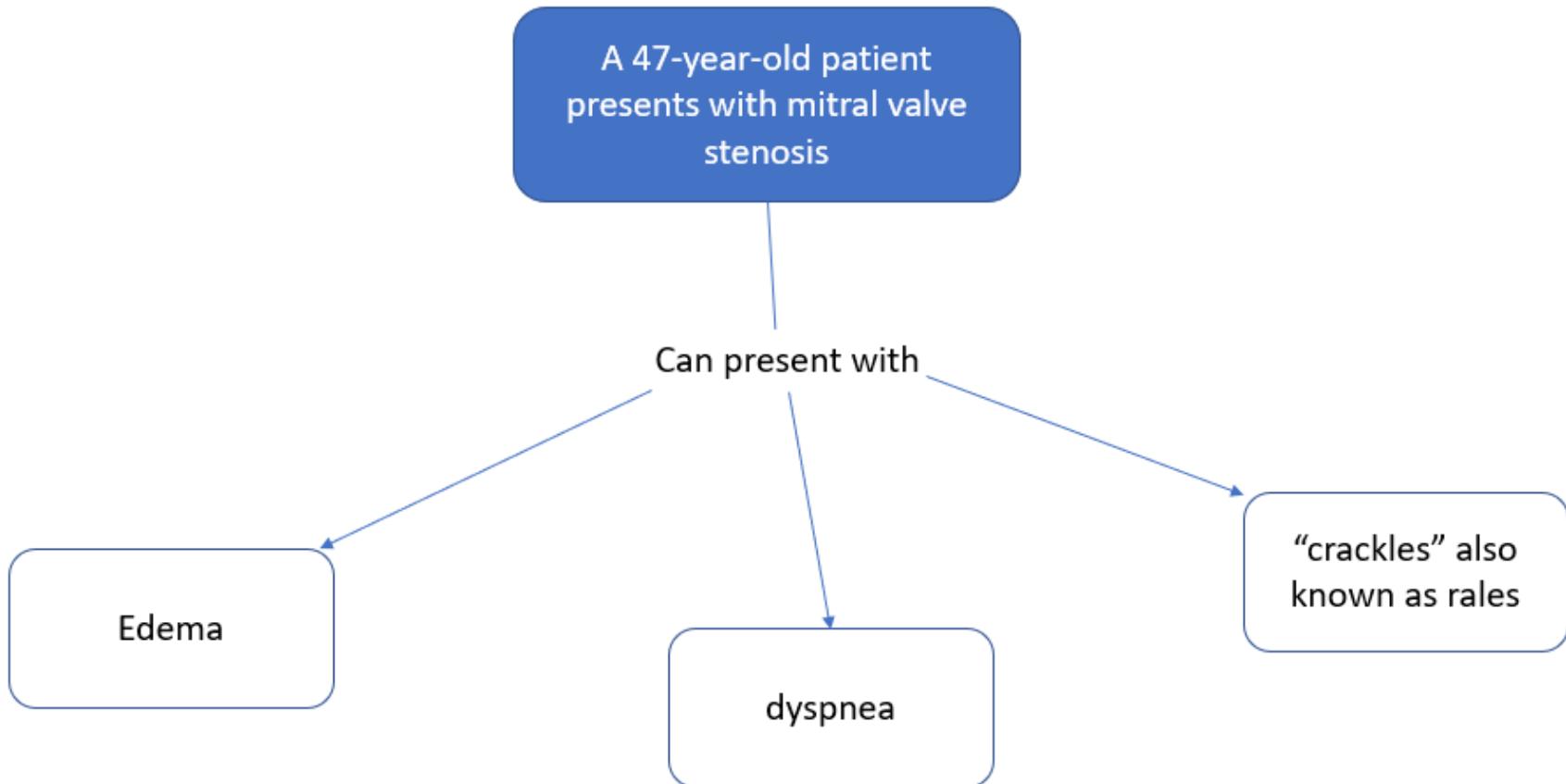
Physical examination shows severe lower extremity edema due to excessive interstitial fluid. There is evidence of free abdominal fluid. Her blood pressure is 100/75 and her pulse is 120 and weak. There is jugular vein distention even when she is sitting. Breathing frequency is 26 and labored. Listening to the lungs with a stethoscope reveals signs of considerable pulmonary congestion (crackles and rales). There is a retrosternal lift. Listening to the heart reveals an opening snap and a long diastolic rumble (rumbling murmur) at the cardiac apex. There is pre-systolic accentuation of the murmur.

Ultrasound Report:

Enlarged left atria, mitral valve opening 1.35 cm² (normal 4.0-6.0 cm²), left ventricular normal size, normal aortic valve function, right ventricular hypertrophy, enlarged right atria



“starter map”



Resources:

****No internet except to use the below resources:

1. Costanzo textbook (accessible through library website)
2. Dr. Harris' lecture slides
3. Following slide

DYSPNEA

CLINICAL FEATURE 

Causal Explanation (Why?)

Dyspnea is a symptom of breathing discomfort which is described as chest tightness, increased work of breathing, or air hunger by patients. In cardiogenic shock, dyspnea is caused by the activation of both peripheral mechanoreceptors and chemoreceptors. As the left ventricle is unable to pump effectively, the pressures proximal to the left ventricle begin to increase. Pulmonary edema can result from these pressures and can be heard as crackles by physical exam or seen by x-ray. Juxtagapillary mechanoreceptors (J receptors) located near the alveolar-capillary membrane sense this engorgement of blood due to back pressures. The signals generated as a result of receptor activation are transmitted to and processed in the respiratory centers of the medulla oblongata, and then relayed to the somatosensory cortex, insular cortex, and amygdala, where they are perceived as dyspnea and drive motor activation of the respiratory system.

Shock - Cardiogenic

Harris D, Ngo K (Lead Editors); Basha M, Bernstein J, Cline S, Daroowalla F, Gallman E, Hayes N, Miller K, Sheridan L, Tong A (student), Yoest J (Contributing Authors in alphabetical order). *Aquifer Sciences Integrated Illness Scripts: Shock - Cardiogenic*. Fall LH and Wilson-Delfosse AL, eds. www.aquifer.org



Important Concepts to Consider:

1. Ohm's Law
2. Starling's law of the capillaries
3. Postural position on volume distribution
4. Regulation of mean arterial pressure

Concept Map Assessment

Table 1. Rubric for evaluating group Concept Maps

Total:

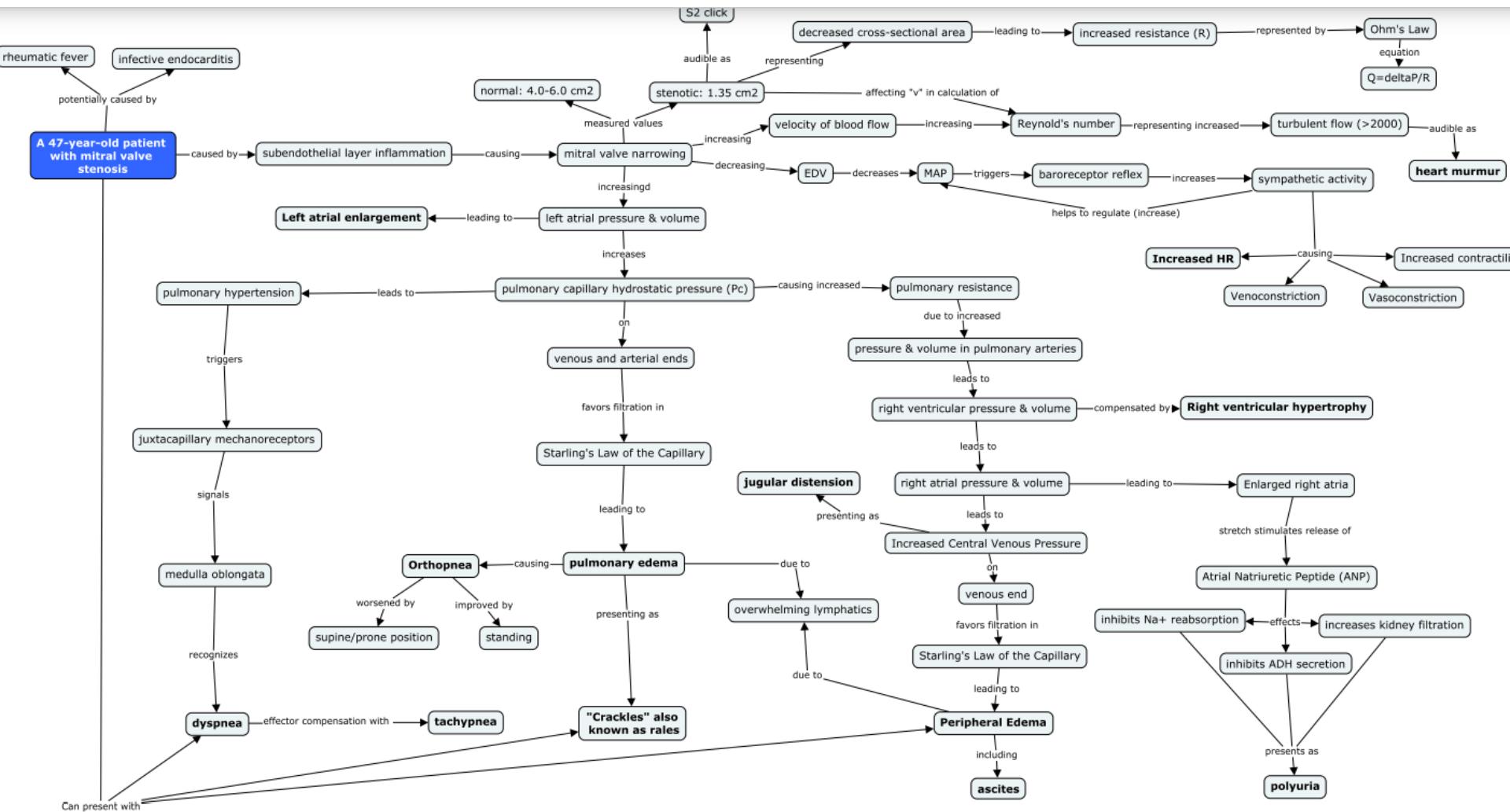
7-8 pts exceeds = 100%

4-6 pts meets 85

<4 pts below 70

	Exceptional (exceeds expectations)	Proficient (meets expectations)	Developing (below expectations)
Content	<ul style="list-style-type: none"> • All relevant concepts are included • Free of misconceptions. • Clearly depicts all underlying mechanisms related to learning objectives <p style="text-align: center;">3 points</p>	<ul style="list-style-type: none"> • Most relevant concepts are included • Free of all but one misconception. • Depicts the majority of underlying mechanisms related to learning objectives <p style="text-align: center;">2 points</p>	<ul style="list-style-type: none"> • Some relevant concepts are included • Includes two or more misconceptions. • Fails to depict key underlying mechanisms related to learning objectives <p style="text-align: center;">1 point</p>
Relationship	<ul style="list-style-type: none"> • Clearly depicts the meaning of the relationship between concepts using accurate linking words. • Relationships demonstrate excellent understanding of the topic <p style="text-align: center;">3 points</p>	<ul style="list-style-type: none"> • The meaning of the relationship between concepts is established but linking words are not always accurate • Relationships demonstrate a good understanding of the topic <p style="text-align: center;">2 points</p>	<ul style="list-style-type: none"> • Relationship between concepts are not clearly depicted. Linking words are missing or are inaccurate most of the time. • Relationships demonstrate a poor understanding of the topic <p style="text-align: center;">1 point</p>
Organization	<ul style="list-style-type: none"> • All sections of the map have concepts connected in a hierarchical structure (general to specific) • Map is well laid out <p style="text-align: center;">2 points</p>	<ul style="list-style-type: none"> • Most sections of the map have concepts connected in a hierarchical structure (general to specific) • Map is fairly well laid out <p style="text-align: center;">1 point</p>	<ul style="list-style-type: none"> • Few sections of the map have concepts connected in a hierarchical structure (general to specific) • Map is poorly laid out <p style="text-align: center;">0.5 point</p>

Example



Grading

Two physiologists (content experts) graded (10 groups each) + non-content experts

Targeted Turnaround: 2 days

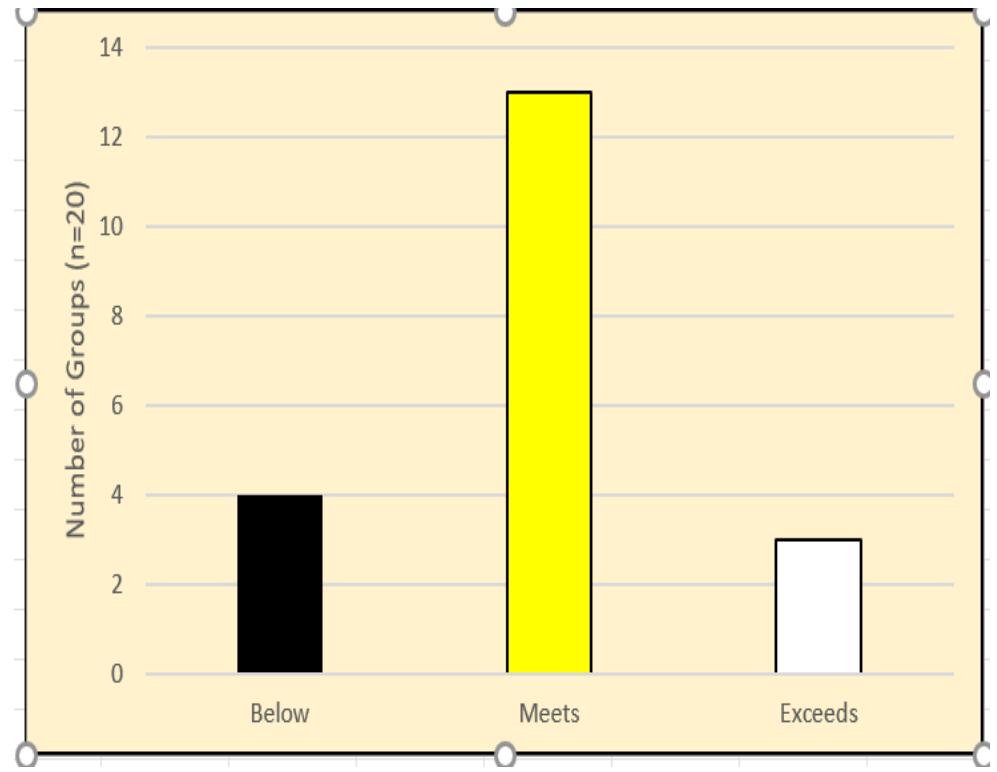
Feedback provided for all concept maps and specific targeted to the rubric



How did we do?

Content experts had quick turnaround (<2 days), but non-content experts took longer

We were unable to provide pointed feedback on the map directly & also had to download cmap to grade



What did we learn early?

Faculty needed quick turnaround of feedback and way to provide direct, specific feedback ON the concept map

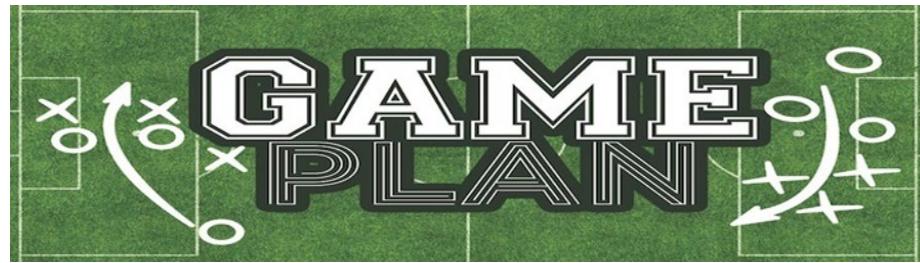
30-45 minutes to grade each concept map (5-10 hours for 10 groups)

Use of non-content experts?

Faculty are not necessary DURING the activity



What changes did we make?



- Work in groups
- ~~Faculty and~~ educational technology facilitators
- Apply the knowledge of foundational physiology
- Save your concept map as ~~Cmap~~.pdf
- Upload your map into webcourses assignment before 10 AM

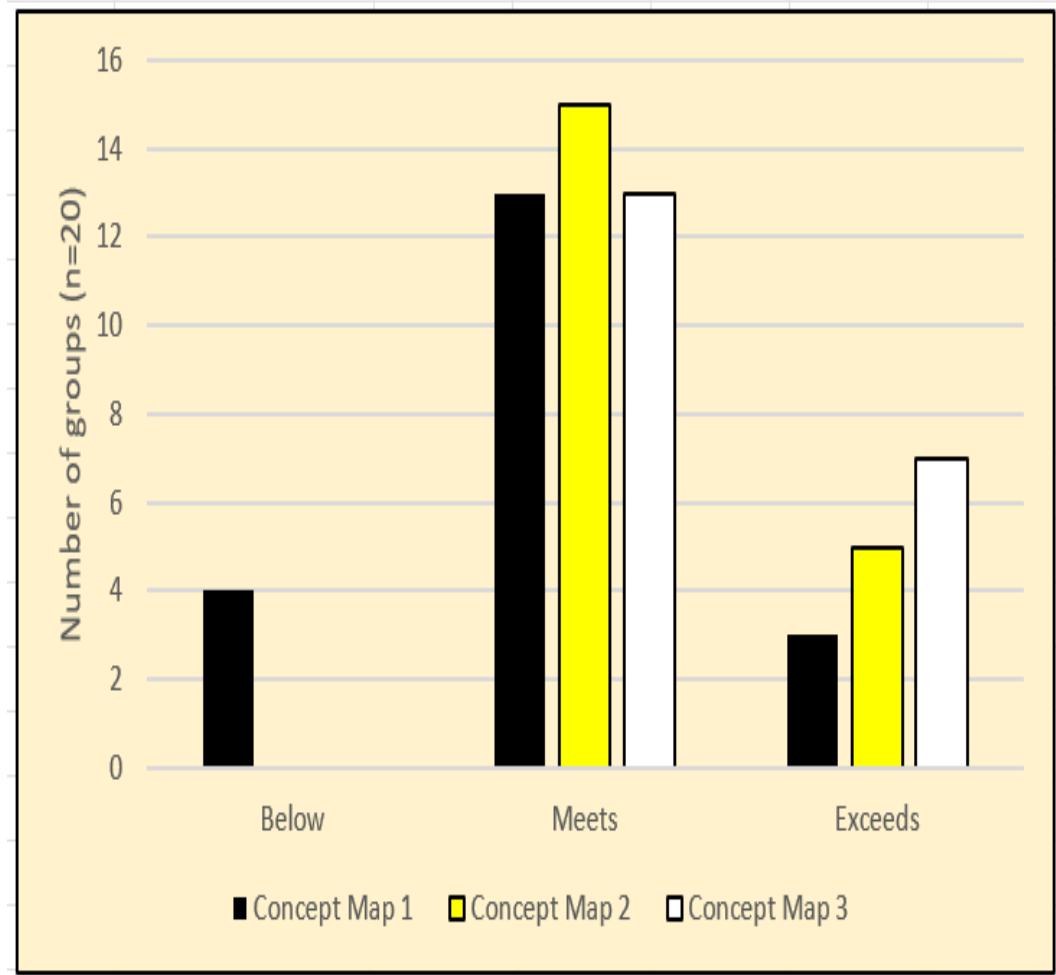
Where are we now?

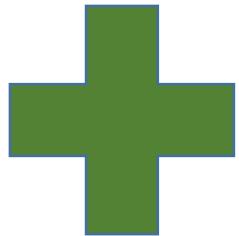
Questions:

Are students getting better?

Will students get bored?

Are we using the right topics?





Faculty can visualize learning

Additional method of assessment other than MCQ

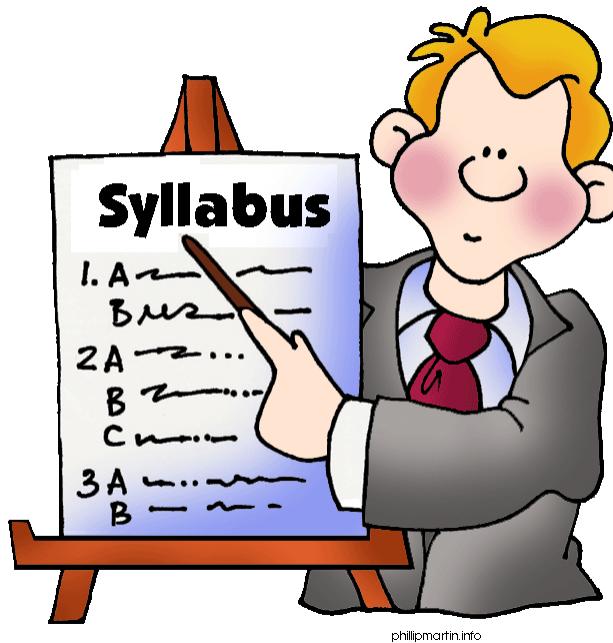
Students receive feedback on learning

Concept maps can be built/changed over time

Increases and necessitates reallocation of faculty time

Subjective grading = student stress

Difficult to put a percentage (what differentiates an 82 from 87?)



philipmartin.info

Recognize one's limits of anatomical and physiological knowledge and identify when additional resources are needed to evaluate clinical problems.

High Fidelity Patient Simulation

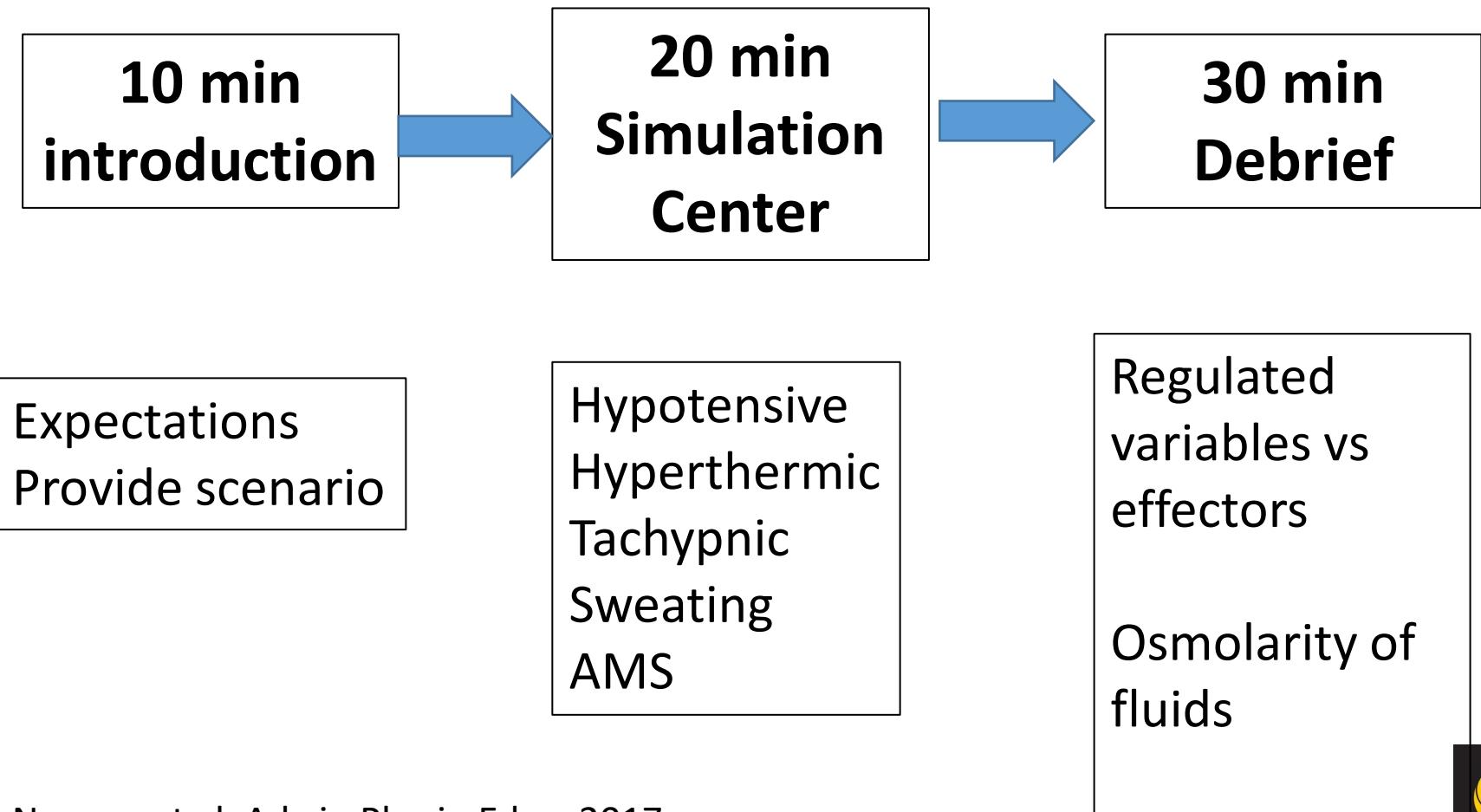


October 2021: heat related illness

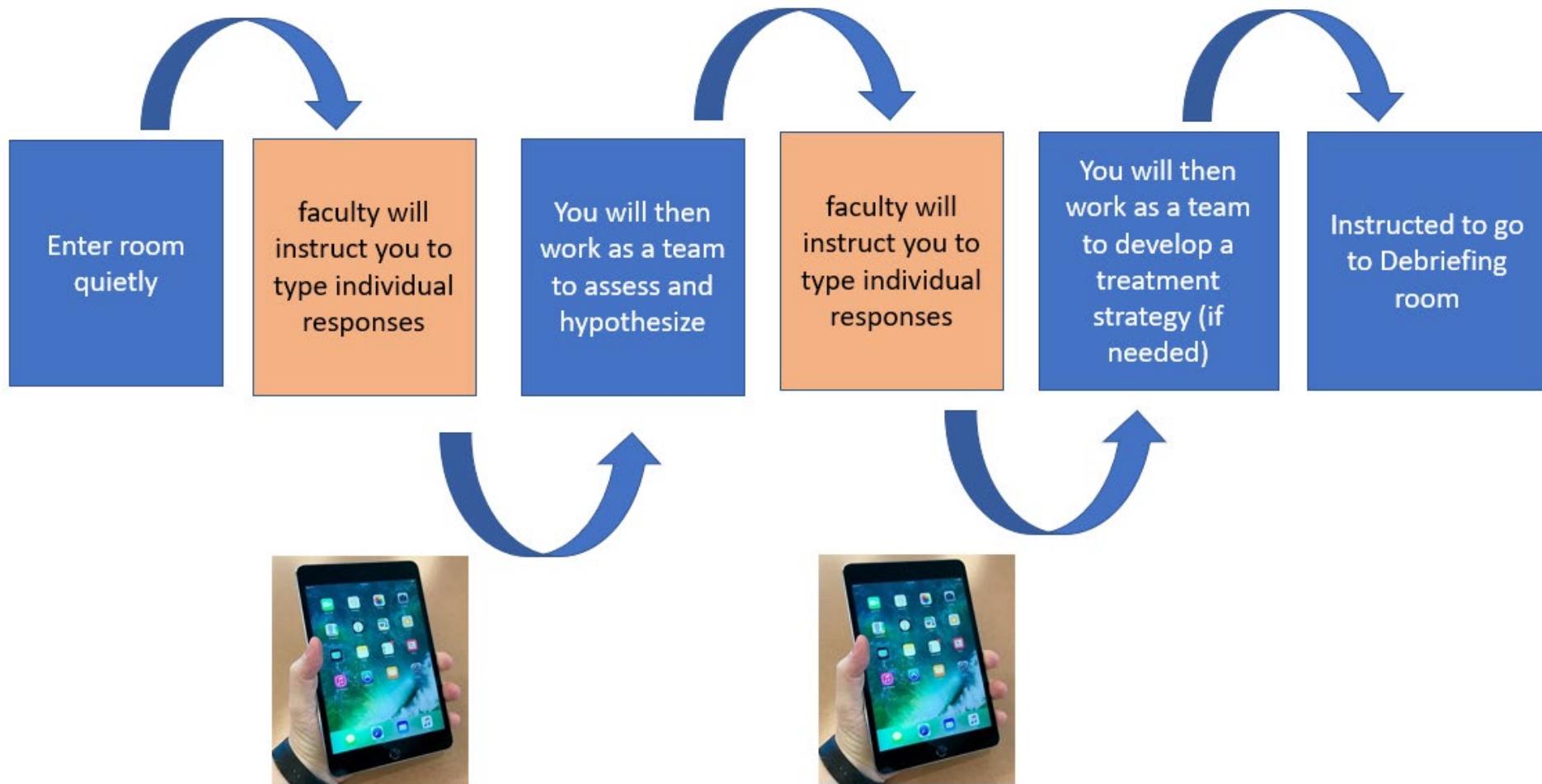
November 2021: congestive heart failure

January 2022: diabetic ketoacidosis

Patient presentation: Heat Related Illness



Slowing down the Process





Students respond to formative essay questions at the end of the week.



Students are provided faculty answers for that essay question

Students reflect on how they answered the questions and consider study strategies

Faculty provide formative feedback on the reflection

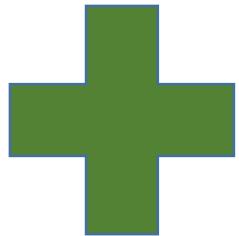
Simulation Reflection

1. Identification of what was incorrect/correct in your thought processes.
2. Why you believe that you were incorrect/correct in your thought processes? (these are some examples: was there a gap in knowledge? did you struggle with applying information?)
3. Develop a plan to how you will improve and what worked or did not work in your study approach. (examples: will begin to take formative quizzes, will work with a student study group)

Student Reflections

"I believe my incorrect thought process came from my gap in knowledge. I knew enough to recognize that the vitals were abnormal, but not enough to understand the importance of the low blood pressure. I also had a gap in knowledge regarding the correct NS to give the patient because I did not understand at the time why the 0.9% was the one we should give the patient." **Student A**

"I struggled at first with confidence I think, meaning I had an idea of what vitals to look for, and following that, which treatment plan to go down, but I wasn't sure of myself until I talked things over with my peers. This shows me why it's good to have assistance in my future healthcare work, but it's also nice to be sure of myself at times as well. I believe the one gap in knowledge I had was knowing which saline to give (I just knew to give fluids), but after discussion with my peers, I understand why normal 0.9 saline was the correct option to ensure fluid enter the extracellular space and raised blood volume (therefore BP). ." – **Student B**



Mechanism to facilitate metacognition

Highly engaging activity

Clinical application of basic science

Fun for faculty (facilitators)

Resource intensive

Faculty time for narrative feedback

Is the return worth the investment????

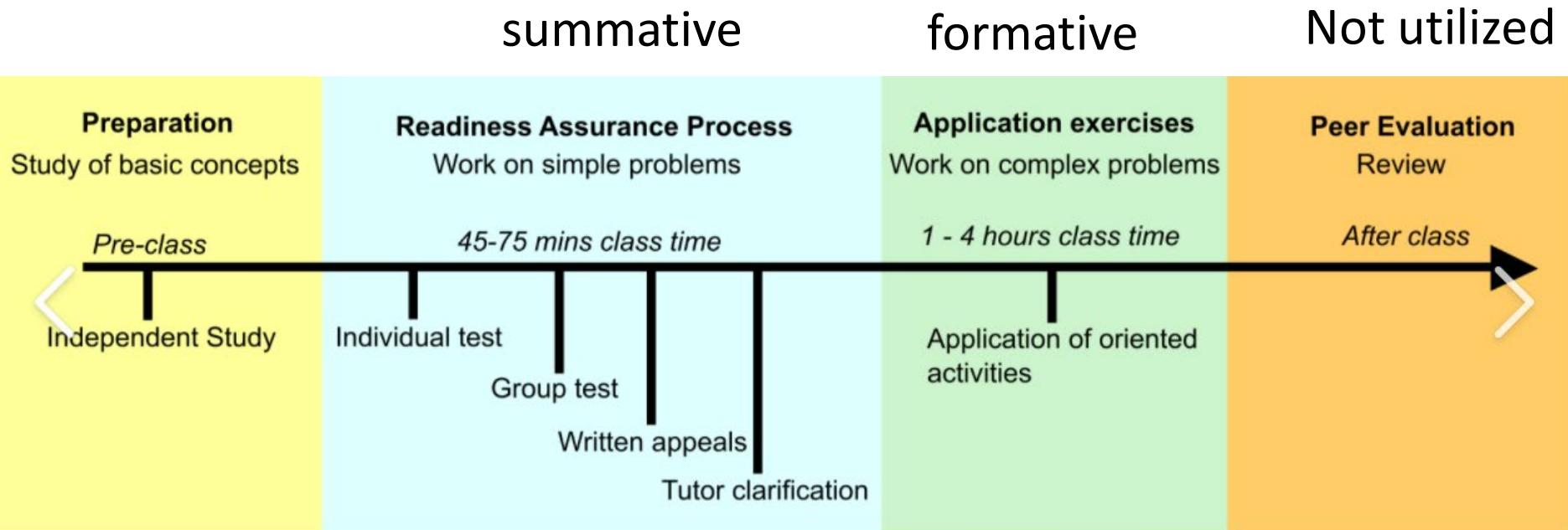
TEAM-BASED LEARNING

*A Transformative Use
of Small Groups
in College Teaching*



Edited by
**LARRY K. MICHAELSEN,
ARLETTA BAUMAN KNIGHT
AND L. DEE FINK**

Previously....



This year

summative

summative

utilized

Example

|Sheakley M , Baumberger J, Seidel C, Benjamin L, Rhodes C, A Case of Congenital Heart Defect for First Year Medical Students - team based learning format.
MedEdPORTAL; Available from: <http://services.aamc.org/mededportal> ID=3174

- Instead of giving images or measurements, we asked students to predict changes in certain items.
- We told the students that the patient had an atrial septal defect.

1. Predict changes on chamber wall thicknesses on a 4 chamber apical view with echocardiogram of this patient (ultrasound) including a short, one paragraph justification.
2. Predict the mean electrical axis in this patient with a short, one paragraph justification.
3. Predict changes in measured pressures below if this patient underwent a pulmonary artery cardiac catheterization (Swan-Ganz catheter). *The changes should be compared with a normal, healthy person and should be **INCREASED, DECREASED, or SAME.***

Pressures in patient

Pulmonary capillary wedge pressure =

Pulmonary artery pressure =

Right ventricular pressure =

Right atrial pressure =

Right ventricular oxygen levels =

Right atrial oxygen levels =

4. Why do you think she sometimes has palpitations when playing? (Should be a sentence or two)



Why do you think she sometimes has palpitations when playing? (Should be a

Modified Grading Scale was used

Grading:

0 out of 4 correct = 50 %

1 out of 4 correct = 63 %

2 out of 4 correct = 75 %

3 out of 4 correct = 88 %

4 out of 4 correct = 100 %

Applied Focus Exercise Performance

	TBL2	TBL3
Average:	92.3	88
Min:	69	67
Max:	100	100



Key Takeaways

Modify what you have or what is already created

Recognize “cultural” shift for students and faculty as faculty roles transition

Keep eyes on what you want the students to be able to do, what you value, and measure it



Thank you!

**David.Harris2@
Ucf.edu**

