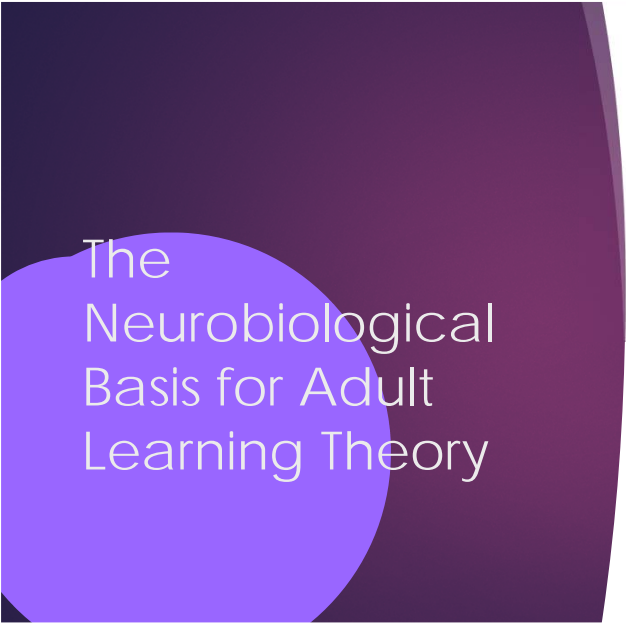
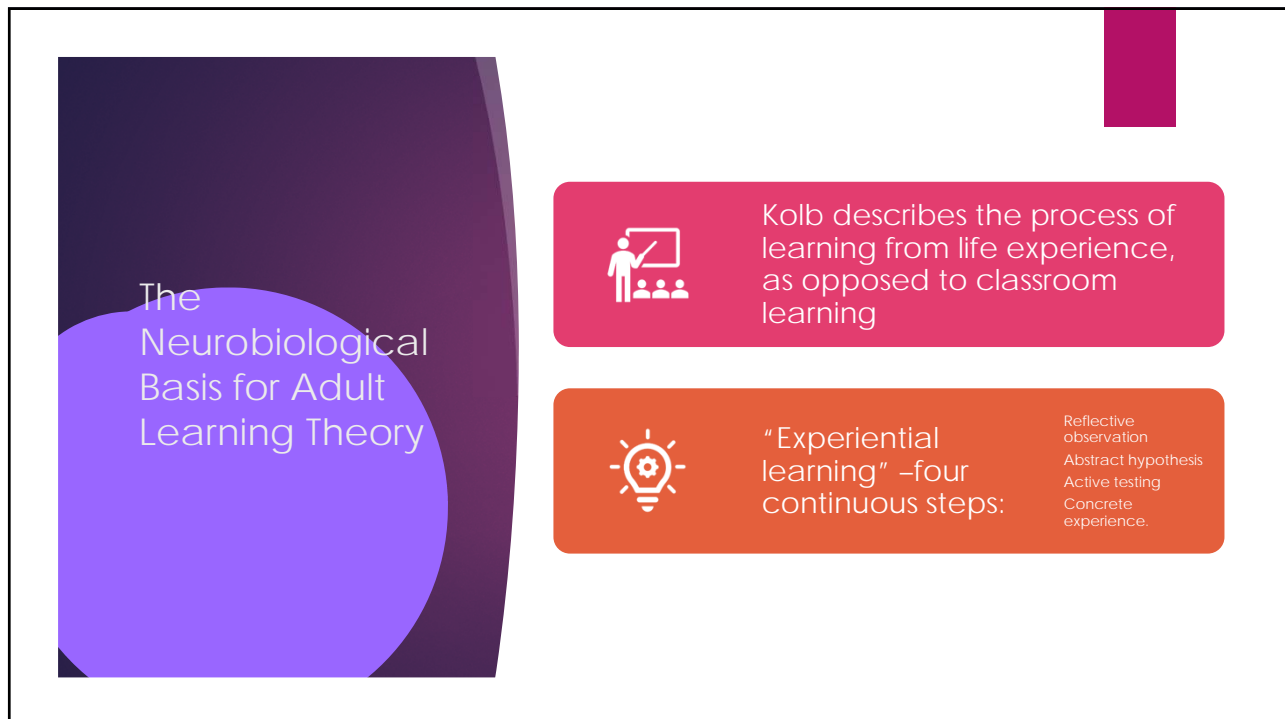


"I am not a teacher: only a fellow-traveler
of whom you asked the way. I pointed
ahead—ahead of myself as well as you."
-George Bernard Shaw

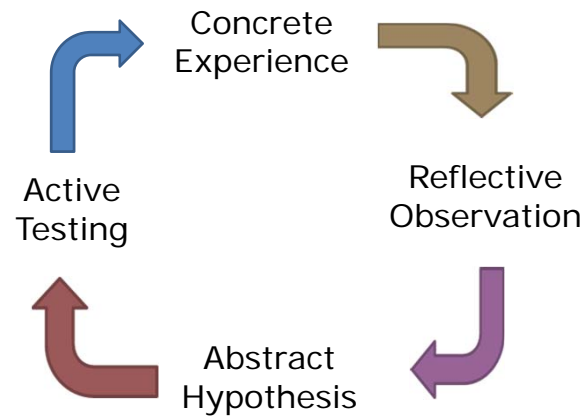


The
Neurobiological
Basis for Adult
Learning Theory

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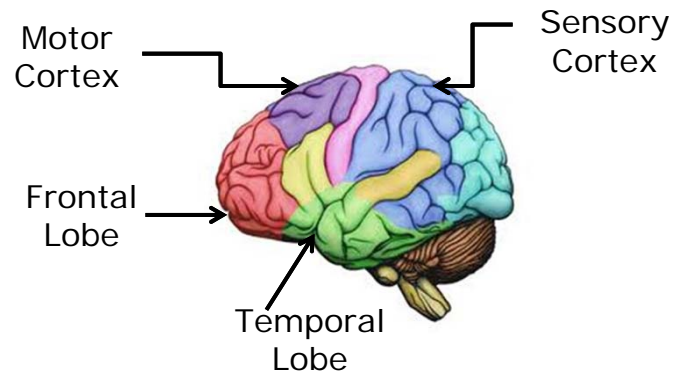
Experiential Learning



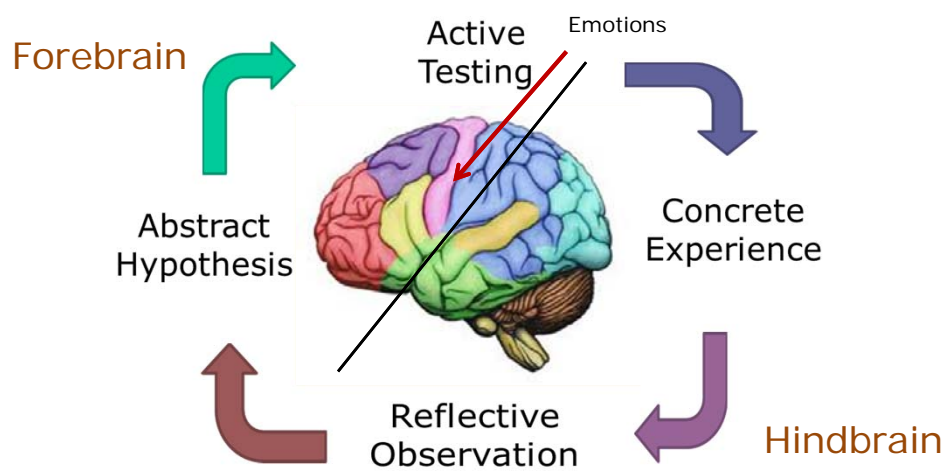
The Neurobiological Basis for Adult Learning Theory

- ▶ Zull went a few steps further in explaining how this process works biologically in the brain
- ▶ Hindbrain (sensory cortex and temporal lobe) are both involved in
 - ▶ Receiving information (the concrete experience)
 - ▶ Reflective observation
- ▶ Forebrain (motor cortex and frontal lobe)
 - ▶ Active testing.
 - ▶ Emotions—Zull believed this was the key to forming long-lasting memory.

Experiential Learning

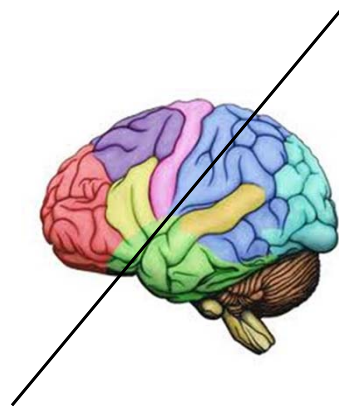


Experiential Learning



Zull, James

Experiential Learning



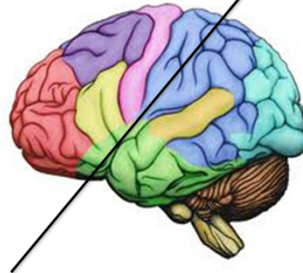
Hindbrain

- Senses Experiences
- Reflects on Experiences
- Automatic Behaviors
- Fast
- Short-term Memory

Experiential Learning

Forebrain

- Generates new thoughts
- Analytic behavior
- Slow
- Changes information to understandable, storable long-term memory



The Neurobiological Basis for Adult Learning Theory

- ▶ Why is all of this complex discussion of adult learning theory and the biological basis behind the theory important?
 - ▶ Application in graduate medical education of Kolb's theory of experiential learning is demonstrated in the hands-on experience of residents in clinics and the hospital, taking care of real life patients.
 - ▶ Didactic time is designated so that particular topics may be more formally taught. If a classroom can offer an experience other than passive reception of information in a lecture, different areas of the brain are stimulated, leading to greater knowledge retention. (Zull)

The Neurobiological Basis for Adult Learning Theory

- ▶ Giving slide-based lectures is not always wrong
 - ▶ Slides can augment and highlight information, especially with pictures that illustrate pathology and disease processes
 - ▶ Multi-sensory approach to learning is more effective. (Doyle, Zakrajsek)
 - ▶ You must engage your audience.

Interactive Classroom Styles

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Flipped Classroom



Takes more time in preparation for the instructor and for the learner



Allows the learner practice the knowledge learned, and thus retain it



Learner-centered, instructor-facilitated (McLaughlin)



Residents are given assigned readings and are expected to come prepared to discuss the assigned material



Instructor gives a short lecture, after which the learners go through cases and apply the material learned prior to the session.

Evidence for Flipped Classroom:

- ▶ Pilot study from 2014-2015
- ▶ 39/40 Pediatric PGY-2's at Children's National Health System in Washington, DC
- ▶ Utilized a novel flipped classroom curriculum to provide RAT training
- ▶ Measured effects

Resident-as-Teacher Schedule at Children's National Health System, 2014

8:00-8:15 AM	Breakfast and welcome: Orientation to flipped classroom approach
8:15-9:15 AM	Three-station objective structured teaching examination (OSTE)
9:15-9:45 AM	Workshop 1 (Topic: Adult Learning) Group discussion and application based on articles and quiz completed at home Readings: 1. Kaufman DM. Applying educational theory in practice. <i>BMJ</i> . 2003;326:213-216. 2. Newman P, Peile E. Learning in practice: Valuing learners' experience and supporting further growth: Educational models to help experience adult learners in medicine. <i>BMJ</i> . 2002;325:200-202.
9:45-10 AM	Break
10-10:30 AM	Workshop 2 (Topic: Giving Feedback) Prework Independent work: Reading and completion of questions Readings: 1. Little M, Hewson M. Giving feedback in medical education. <i>J Gen Intern Med</i> . 1998;13:111-116. 2. Ende J. Feedback in clinical medical education. <i>JAMA</i> . 1983;250:777-781.
10:30-11:30 AM	Workshop 2 (Topic: Giving Feedback) Consensus building on question answers, interactive discussion on topic, simulation with standardized learner
11:30 AM-12:30 PM	Lunch break

Evidence for Flipped Classroom:

Table 1

Pre- and Postworkshop OSTE Scores^a for Residents as Scored by Standardized Learners at Children's National Medical Center, 2014

Domain	Preworkshop score, mean (SD)	Postworkshop score, mean (SD)	Difference in pre- and postworkshop scores	<i>P</i> value	Standardized effect size
Teaching a skill	2.72 (0.51)	3.33 (0.60)	0.61	< .001	1.10
Giving feedback	4.21 (0.43)	4.56 (0.43)	0.35	.005	0.81
Orientating a learner	3.79 (0.50)	4.31 (0.50)	0.53	< .001	1.06

Abbreviations: OSTE indicates objective structured teaching examination; SD, standard deviation.
^aOSTE performance scores had a possible range of 1 to 5.

Chokshi, B. *Academic Medicine*. 2017; 92(4):

Evidence for Flipped Classroom:

- ▶ 2017 systematic review
- ▶ 46 articles
 - ▶ 9 controlled studies
- ▶ Promising teaching approach
 - ▶ Motivation, task value, engagement
- ▶ Students generally like the FC



Interactive teaching styles are more effective

- ▶ Study of 9 residency programs
- ▶ Three different teaching styled for same topic
 - ▶ Traditional slide-based lecture
 - ▶ Engaged classroom
 - ▶ High-tech simulation
- ▶ Pre-test given prior to session
- ▶ Post-test given two weeks later
- ▶ Engaged classroom and high-tech simulation resulted in greater knowledge retention and learner satisfaction than traditional slide-based lecture

Raleigh MF, Wilson GA, Moss DA, Reineke-Piper KA, Walden J, Fisher DJ, Williams T, Alexander C, Niceler B, Viera AJ, Zakrajsek T. Same Content, Different Methods: Comparing Lecture, Engaged Classroom and Simulation. *Family Medicine*, 2018;50(2):100-105.

Let's practice
some
interactive
teaching styles

Think/Pair/Share

1

Ask your audience of learners to think about a specific area of the topic under discussion

2

Pair with another learner and discuss it with each other for a few minutes

3

When you bring the group back together, ask each pair to share their thoughts

Think/Pair/Share



STRENGTHS WEAKNESSES CHALLENGES OF IMPLEMENTATION

Jigsaw

Divide the learners into small groups of three to five

Assign each of the groups a sub-topic

After giving them time to research and discuss (differential diagnosis, possible lab workup and imaging studies, and recommended treatments, etc.) have a spokesperson from each group present the findings to the class

Supplement with your own discussion/slides, etc.

Usual group time—about 10 minutes

Usual full class time—about 30 minutes



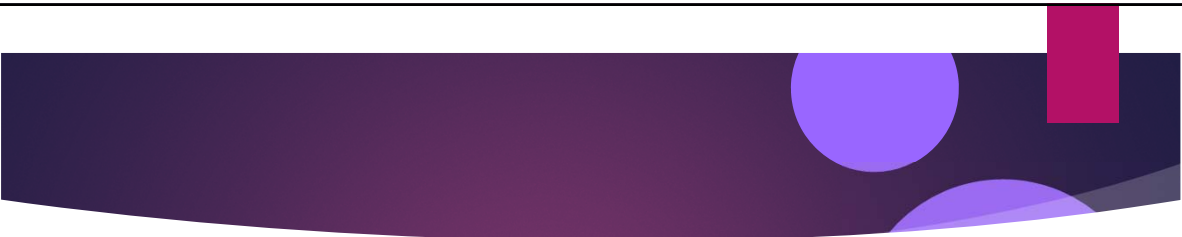
Group 1: Lobster Bisque

Group 2: Caesar salad with homemade dressing

Group 3: Beef Wellington

Group 4: Tiramisu

Dinner



HINT: In these interactive lecture styles, don't specify a time for the discussion. Listen to your audience. At the beginning, as the learners are starting the discussion amongst themselves, it will be relatively quiet until they become more engaged. The sound will reach a crescendo in a few minutes, after which it will taper off. When it begins to crescendo again, stop the discussion—that is when the group begins talking about things other than the assigned topic.

Experiences



DEBATE—"CONSTRUCTIVE
CONTROVERSY"
(JOHNSON)



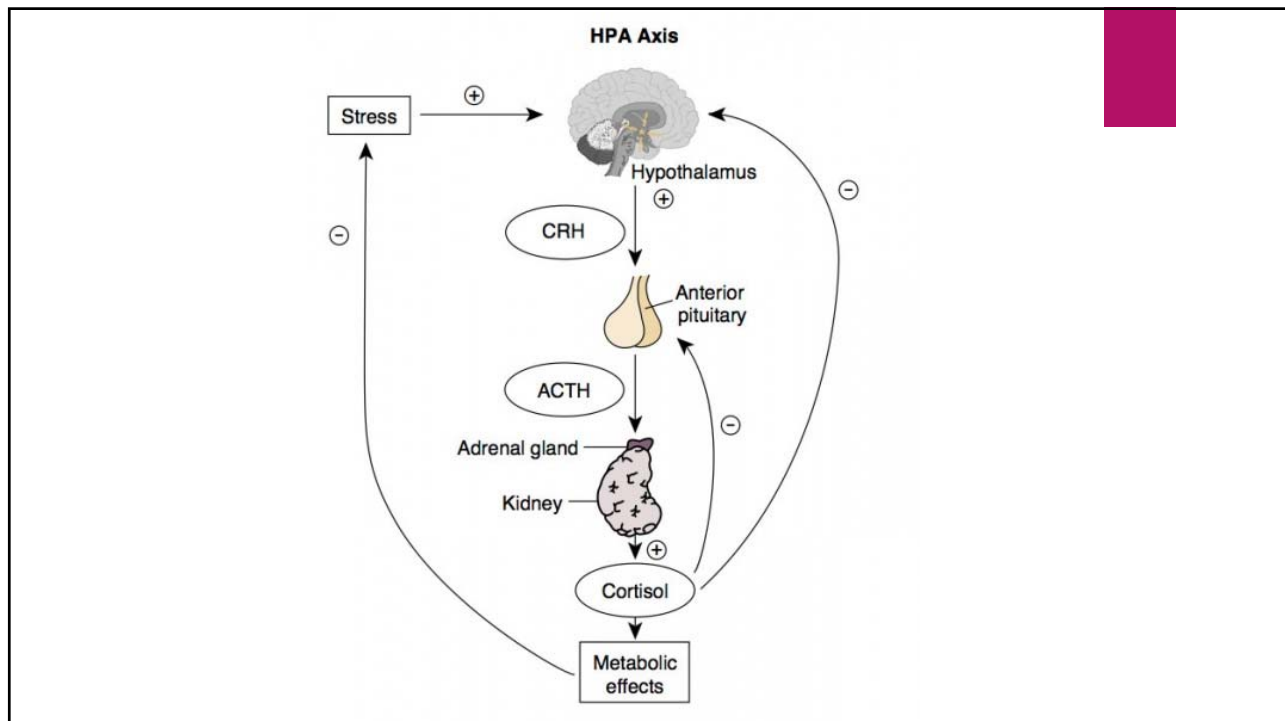
WALKING LECTURE

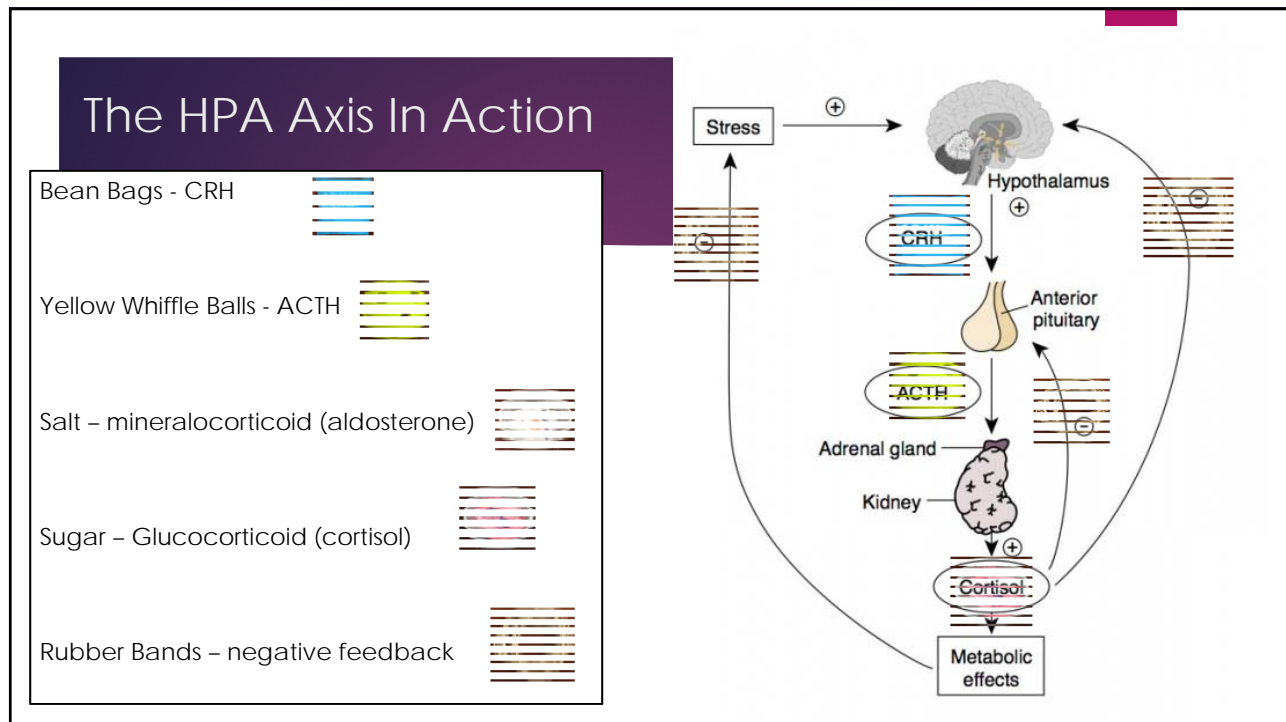


DEMONSTRATION (HPA
AXIS)

The HPA Axis

AS TAUGHT BY JUSTIN JENKINS, DO,
CLINICAL ASSISTANT PROFESSOR OF FAMILY MEDICINE





Online Resources

- Prezi
- Poll Anywhere
- Kahoot

Games



JEOPARDY (LATESSA)



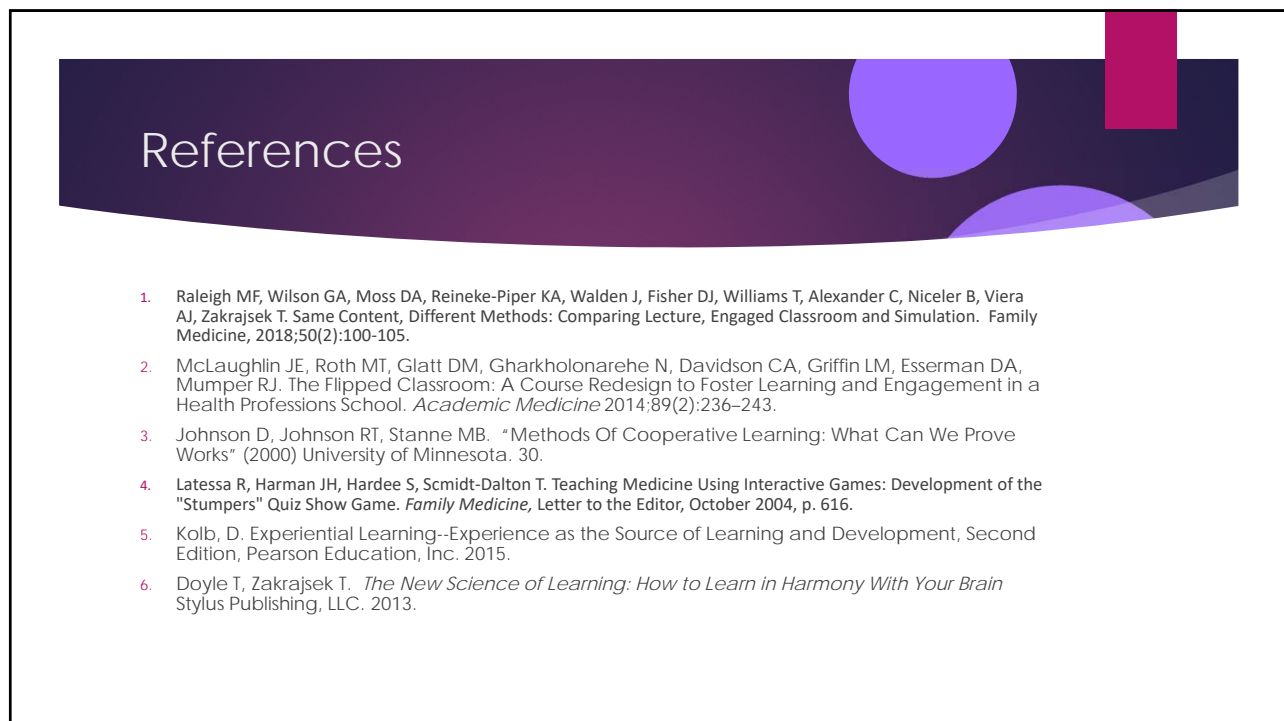
BAR TRIVIA

High-tech Simulation
Virtual Reality
Augmented Reality
3D Printing from MRI/CT



Topics Jigsaw Exercise

- Objectives written (That's another lecture)
- How will you teach these topics



References

1. Raleigh MF, Wilson GA, Moss DA, Reineke-Piper KA, Walden J, Fisher DJ, Williams T, Alexander C, Niceler B, Viera AJ, Zakrajsek T. Same Content, Different Methods: Comparing Lecture, Engaged Classroom and Simulation. *Family Medicine*, 2018;50(2):100-105.
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3. Johnson D, Johnson RT, Stanne MB. "Methods Of Cooperative Learning: What Can We Prove Works" (2000) University of Minnesota. 30.
4. Latessa R, Harman JH, Hardee S, Schmidt-Dalton T. Teaching Medicine Using Interactive Games: Development of the "Stumpers" Quiz Show Game. *Family Medicine*, Letter to the Editor, October 2004, p. 616.
5. Kolb, D. *Experiential Learning--Experience as the Source of Learning and Development*, Second Edition, Pearson Education, Inc. 2015.
6. Doyle T, Zakrajsek T. *The New Science of Learning: How to Learn in Harmony With Your Brain* Stylus Publishing, LLC. 2013.

HARPER



HUDSON