Using Effective Questioning to Advance Learning

Janice C. Law, MD
Associate Professor of Ophthalmology
Gloria M. Sternberg Directorship in Ophthalmology
Vice Chair for Education

Kendra Parekh, MD, MHPE
Associate Professor of Emergency Medicine
Assistant Dean for UME
Vice Chair for Education

Master of Genetic Counseling
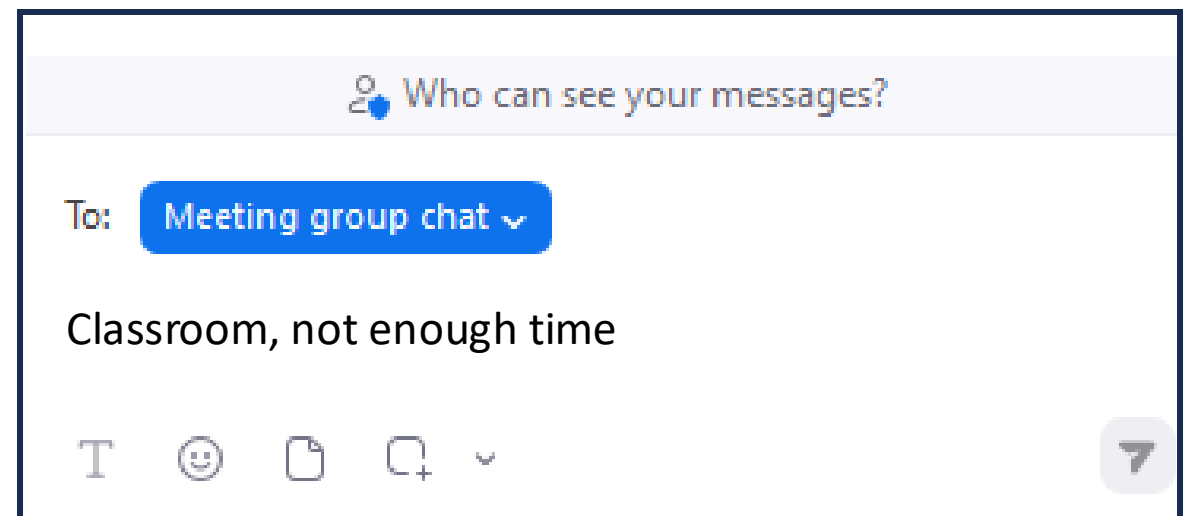Vanderbilt University School of Medicine
The University of Alabama at Birmingham

Disclosures

• No financial disclosures

Getting to Know You

- In the CHAT!!
- What is the primary environment for your teaching?
    (e.g., outpatient clinic, large classroom, small group, simulation, other)?
- What is the biggest obstacle to using effective questioning in teaching?

👥 Who can see your messages?

To: **Meeting group chat ⌄**

Classroom, not enough time

T ☺ 📄 🗨₊ ⌄

Inspiration

- Learners:
  - Leave our training programs to be life-long learners, innovators, leaders
- Educators:
  - Elevate our learning environments
  - Promote effective learning to improve patient care and outcomes
  - Help learners disrupt, challenge current knowledge, push boundaries, discover

Learning Objectives

By the end of this session, participants will be able to:

- o **Describe** the impact of using learner-centered questioning for advancing learning
- o **Compare and contrast** learner-centered questioning and teacher-centered questioning
- o **Design and adapt** effective learner-centered questions that align with learners' goals, prior knowledge, and desired outcomes
- o **Discuss** strategies to manage challenges such as short or non-committal responses from learners.

Activity

- Think of a time when you used questioning as a teaching tool, and it went really badly (or really well).

- What were 2-3 key features in the teaching situations that impacted the effectiveness of questioning.
  - What question(s) did you ask?
  - How did you ask the question(s)?

Why use questions?

The Art of Pimping

JAMA, July 7, 1989—Vol 262, No. 1

Pimp questions should come in rapid succession and should be essentially unanswerable. They may be grouped into five categories:

1. Arcane points of history. These facts are not taught in medical school and are irrelevant to patient care—perfect for pimping. For example, who performed the first lumbar puncture? Or, how was syphilis named?

2. Teleology and metaphysics. These questions lie outside the realm of conventional scientific inquiry and have traditionally been addressed only by medieval philosophers and the editors of the *National Enquirer*. For instance, why are some organs paired?

3. Exceedingly broad questions. For example, what role do prostaglandins play in homeostasis? Or, what is the differential diagnosis of a fever of unknown origin? Even if the intern begins making good points, after 4 or 5 minutes he can be cut off and criticized for missing points he was about to mention. These questions are ideally posed in the final minutes of rounds while the team is charging down a noisy stairwell.

4. Eponyms. These questions are favored by many old-timers who have assiduously avoided learning any new developments in medicine since the germ theory. For instance, where does one find the semilunar space of Traube? Or, whose name is given to the dancing uvula of aortic regurgitation?

5. Technical points of laboratory research. Even when gen-

Questioning Matters in Medical Education
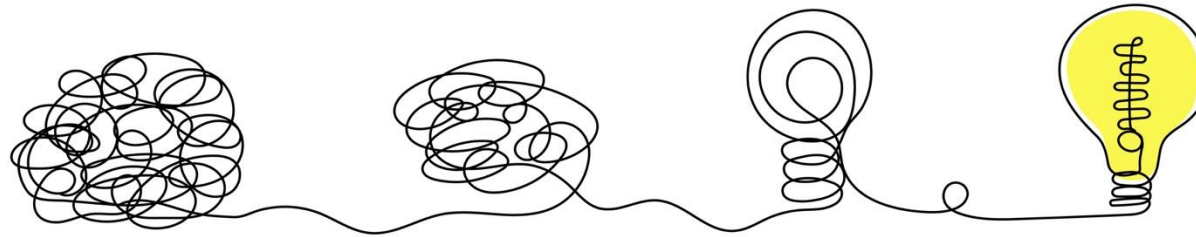
- Encourages <u>active learning</u> and <u>critical thinking</u>
- Enhances <u>retention</u> and <u>application</u> of knowledge
- Facilitates clinical <u>reasoning</u> and <u>decision-making</u>
- Engages learners in <u>self-directed inquiry</u>

VANDERBILT UNIVERSITY
MEDICAL CENTER

Knowles et al. 2005
Choi & Hannafin 1995

Qualities of Effective Questions

- Meaningful, understandable to learner
- Draws out understandings and connections
- Challenges learner but not too difficult
- Not too vague or overloaded

- Invite discussion or debate
- Provokes more questions
- Promotes continued learning
- Encourages further exploration
- New insights
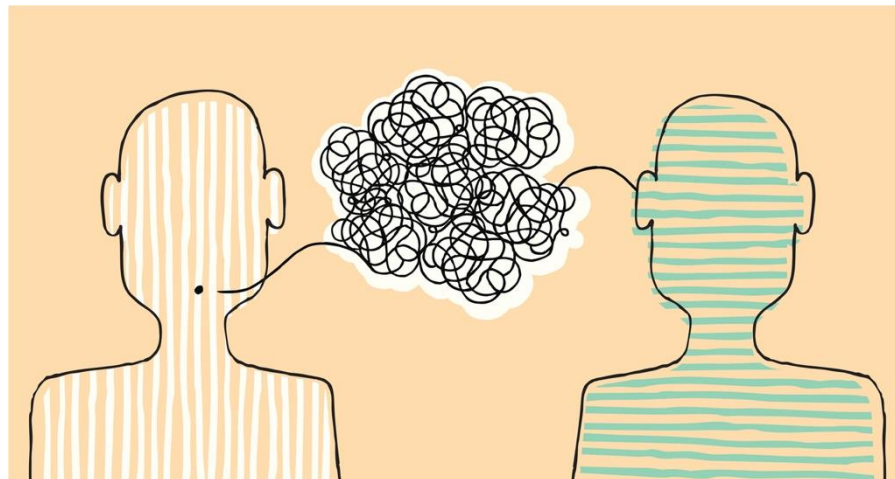
Co-Construction and Co-Regulation of Learning

- Co-construction: shaping understanding together through discussion
- Co-regulation: adjusting questioning to learner needs in real-time

Jonassen, 1991
Karagiorgi & Symeou, 2005
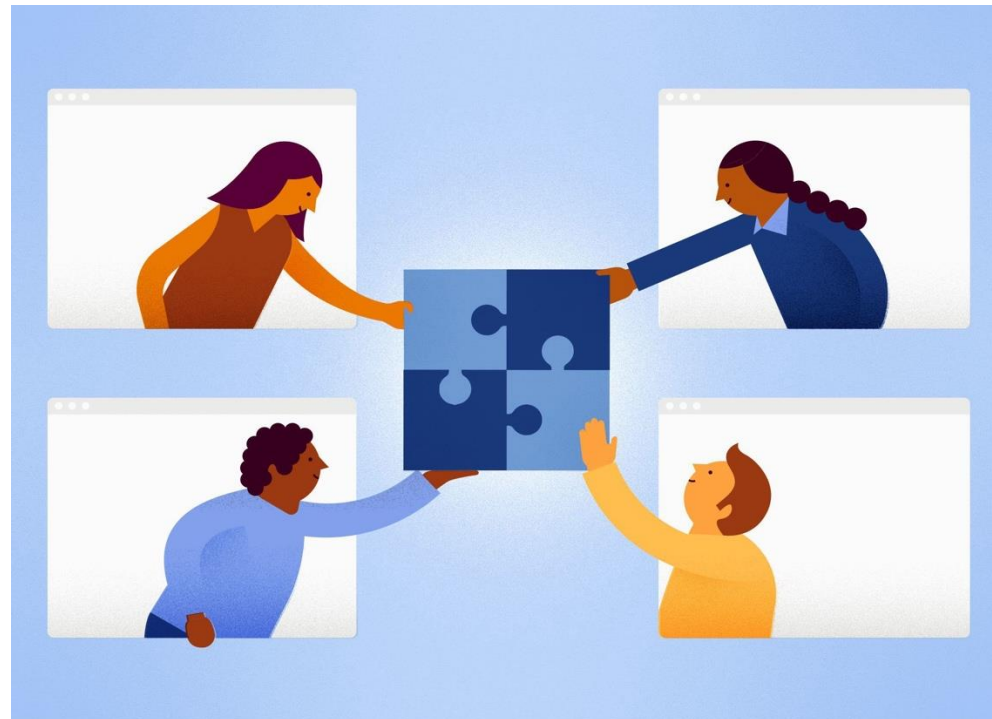
Learner-centered vs Teacher-centered questioning

Feature	Learner-Centered	Teacher-Centered
Focus	Learner's thought process	Instructor's knowledge
Interaction	Open-ended, exploratory	Closed-ended, directive
Evaluation of Learning	Learners evaluate own learning	Only instructors evaluate learner's learning
Outcome	How to think	What to think
Goal	Encourage self-reflection and application	Test recall and correctness

Learner-centered means…

- Ask questions to promote learning and connection, not only recall
- Ask questions at the appropriate time
- Target questions to the desired learning outcome

Also consider:

- Learner-developed questions
- Questioning as thinking (QAT) framework: questioning and think-aloud to promote metacognition

VANDERBILT UNIVERSITY
MEDICAL CENTER

The Impact of Learner-Centered Questioning

- Promotes deeper understanding and retention
- Accelerates confidence in decision-making
- Encourages metacognition and self-assessment
- Sets up patterns for lifelong learning
- Supports a collaborative learning environment
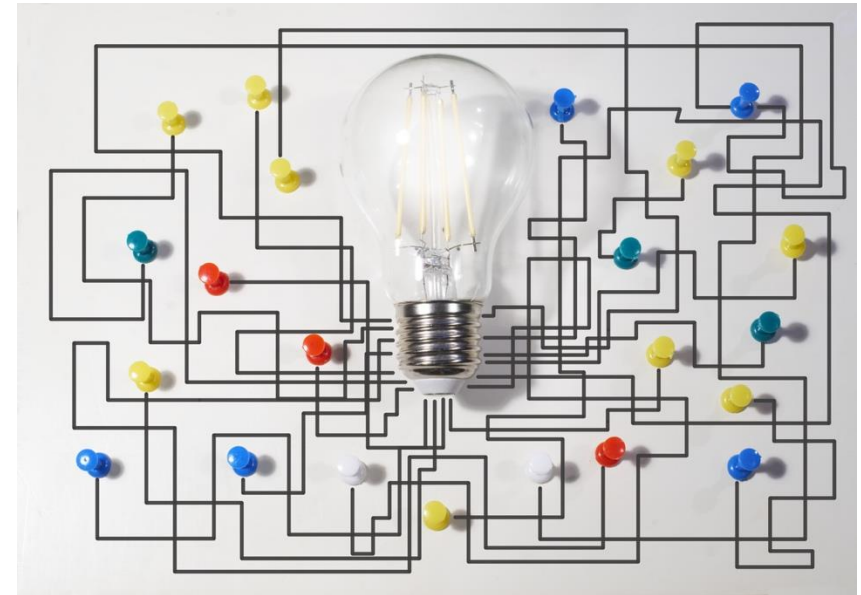
Designing Effective Learner-Centered Questions

- Align with learners' goals and prior knowledge

- Use open-ended prompts

- Avoid yes/no or recall-based questions

- Encourage analysis, synthesis, application

Formulating a Question: The What

- The content of the question
- What will you ask about?

Formulating a Question: The How

- **ONE ACTION VERB** per question
- How will you ask the question?
  - o Phrasing
  - o Word choice
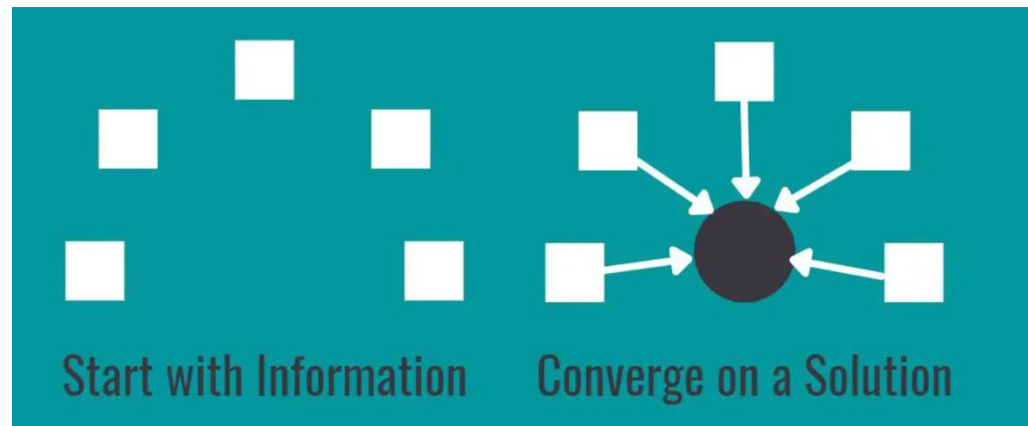 - o Non-verbal communication
  - o Response time

What and How as Powerful Question Starters

[Dr. Glaucomflecken](#)

Categories of Questions:
Convergent and Divergent

Convergent
- Usually a single, correct answer
- Usually test knowledge
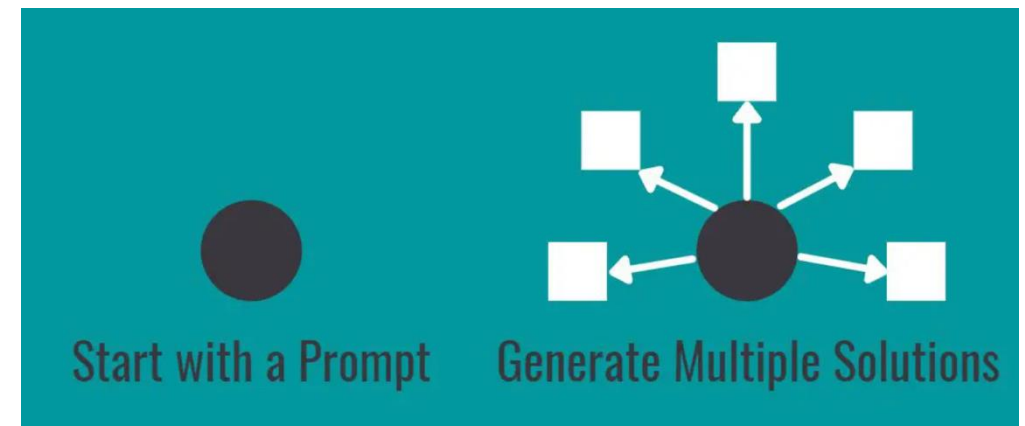- Usually identify a single solution
- **Who, what**, where, when?

Jonathan Sandling

VANDERBILT UNIVERSITY
MEDICAL CENTER

Categories of Questions: Convergent and **Divergent**

Divergent

- No single correct answer

- Usually promotes deeper connection

- Usually identifies multiple solutions

- What if, How could, What might? What do you suppose?

Jonathan Sandling

Ask yourself, why are you asking a question?
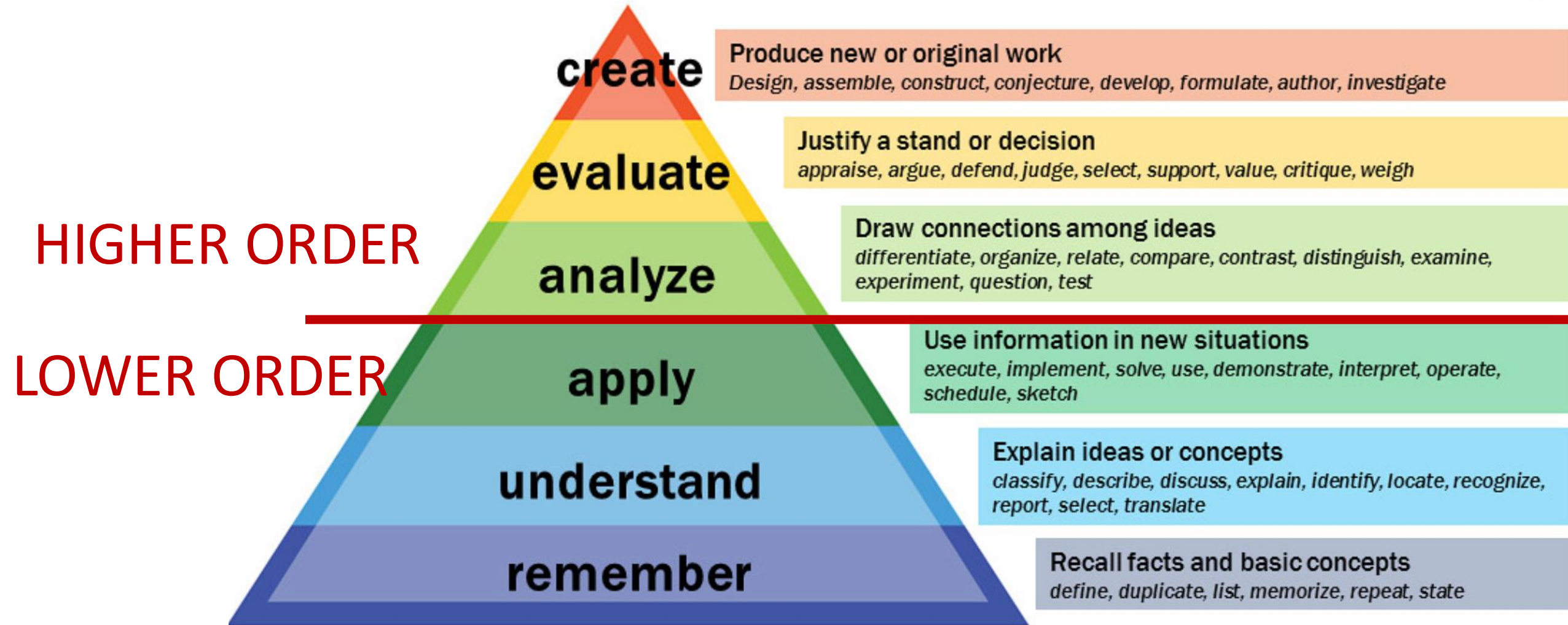
CONVERGENT QUESTIONS

- Explore learners' goals
- Probe prior knowledge
- Check understanding
- Keep attention and participation
- Emphasize what is important
- Assess knowledge

DIVERGENT QUESTIONS

- Assist critical thinking
- Deepen understanding
- Promote comprehension
- Stimulate critical thinking
- Envision applications

VANDERBILT UNIVERSITY MEDICAL CENTER

Taxonomy of Questions

Bloom's Taxonomy

Lowest to Highest	Cognitive Skills	Example Questions
Knowledge List, name, identify, show, define, recognize, recall, state	Requires students to recognize or recall information.	•*How far is Rome from the Mediterranean Sea?* •*What are the species of ancient rhetoric?* •*What organisms are most likely cause for infectious endocarditis?* •*What is the two-hit hypothesis?*
Comprehension Summarize, explain, interpret, describe, compare, visualize, put in your own words	Requires students to restate without verbatim repetition or to cite examples, thereby demonstrating deeper understanding.	•*Explain the process of mitosis in your own words.* •*Can you give some examples of deliberative rhetoric?* •*Describe how TSH levels impact fertility.* •*Explain the mechanism how BRCA-1 can cause cancer risk.*

Taxonomy of Questions

Lowest to Highest	Cognitive Skills	Example Questions
Application Solve, illustrate, calculate, interpret, classify, modify, apply, relate	Requires students to solve a problem by applying their learning to a new situation.	•*As described in your reading from Quintillian, what rhetorical features of prooemia (introductions) can you identify?* •*Select a series of chords and play them in a chromatic sequence.* •*What features of this condition are examples of microangiopathy?* •*Sketch a three-generation pedigree for this patient based on the provided case notes.*
Analysis Analyze, organize, deduce, choose, contrast, compare, distinguish	Requires students to break down a concept or diagnose a situation into constituent parts, and to explain their interrelationships. Questions of comparison or analogy ("How is X like Z?") may also be classified here.	•*Break down the arguments that the author uses to support his hypothesis.* •*How does the artist use shapes and color to emphasize melancholy in this painting?* •*What are reasons for using drug A vs drug B?* •*How do pathogenic, likely pathogenic, and variants of uncertain significance differ in genetic test reports?*

Taxonomy of Questions

Lowest to Highest	Cognitive Skills	Example Questions
Evaluation Evaluate, estimate, judge, defend, criticize, justify	Requires students to make judgments, according to appropriate criteria, about the value of a given work, idea, method, proposal, etc.	•*What is the value of Wikipedia as a knowledge resource?* •*If drugs were legalized, what would be the implications for public health?* •*Which genetic test would be most appropriate for a patient with a strong family history of colon and endometrial cancer?*
Synthesis Design, discuss, hypothesize, write, schematize, create, construct	Requires students to use original thought to creatively solve a new problem. Requires students to put together material for themselves into a new whole or in a new form.	•*How would you design an experiment to show the effect of education on income?* •*How could you increase health literacy in this population?* •*What resources need to be in place to increase preventative care visits?* •*Develop a genetic counseling strategy for a family with a newly identified pathogenic BRCA1 variant.*

VANDERBILT UNIVERSITY MEDICAL CENTER

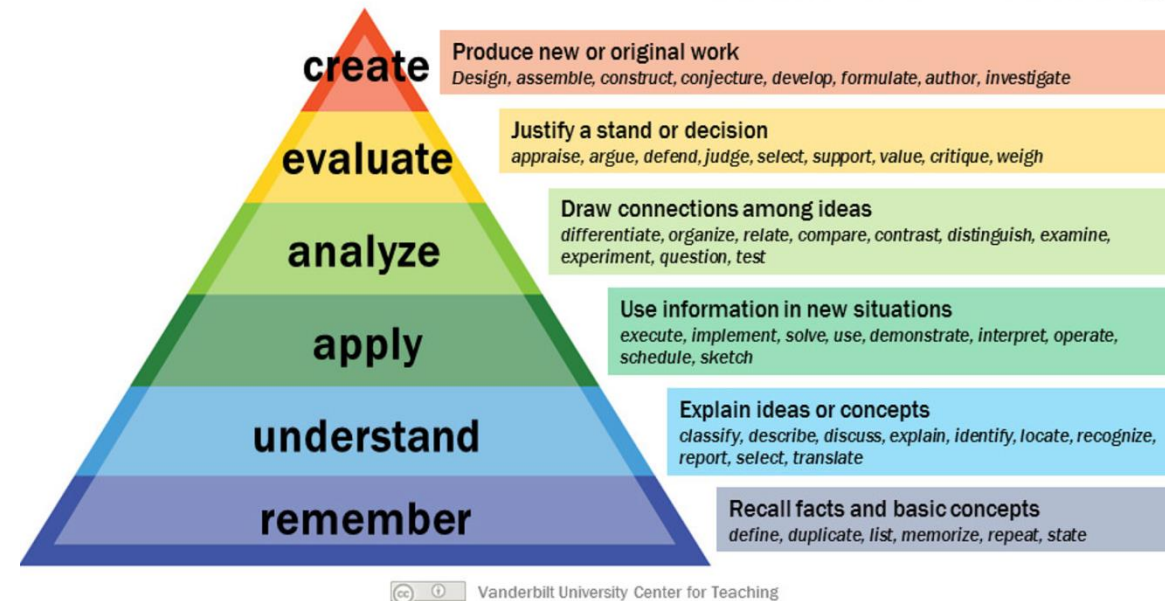# Marzano and Kendall Taxonomy & Taxonomy verbs

Taxonomy and verbs

Group Activity: Convert this to a higher-order question

Classroom Session

- The lecturer's learning point:

"Diabetes is the leading cause of vision loss of working-age Americans."

- The lecturer poses this lower order question to the classroom:
  - What are the reasons why diabetics lose vision?

Bloom's Taxonomy

- **create** — Produce new or original work
  Design, assemble, construct, conjecture, develop, formulate, author, investigate
- **evaluate** — Justify a stand or decision
  appraise, argue, defend, judge, select, support, value, critique, weigh
- **analyze** — Draw connections among ideas
  differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test
- **apply** — Use information in new situations
  execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch
- **understand** — Explain ideas or concepts
  classify, describe, discuss, explain, identify, locate, recognize, report, select, translate
- **remember** — Recall facts and basic concepts
  define, duplicate, list, memorize, repeat, state

Vanderbilt University Center for Teaching

VANDERBILT UNIVERSITY MEDICAL CENTER

Case Scenario: NICU

The genetics team is consulted on a newborn in the NICU diagnosed with cystic fibrosis on newborn screening.

Adapting Questions for Different Learner Levels

- **Novices**: provide structured guidance "What are the key diagnostic features?"

- **Intermediate**: encourage problem-solving "How would you compare and contrast the differential diagnoses?"

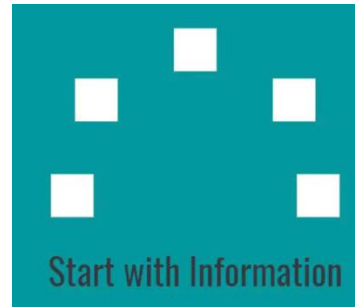- **Advanced**: promote critical evaluation "How did you make your treatment choice?"

Case Scenario: Classroom Setting

A faculty member is giving a lecture to genetic counseling students on the genetics, diagnosis, and management of hereditary hemochromatosis. The HFE gene, AR inheritance, variable penetrance, and counseling challenges of incidental findings are discussed.
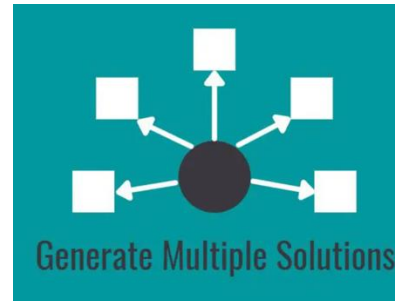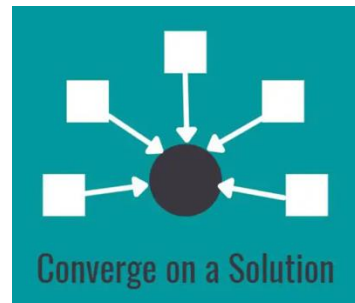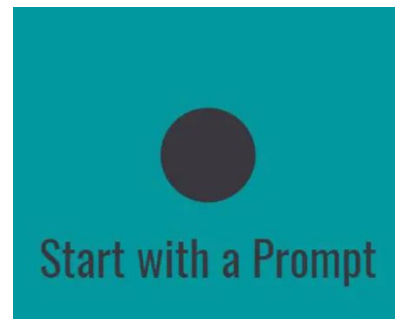

Convergent

Start with Information

Converge on a Solution

Divergent

Start with a Prompt

Generate Multiple Solutions

What
Why
How
What might?
Physical space

Guide on the side

Adapting to Mixed-Learner Groups

- **Scaffold questions**

- Encourage learners to build on each other's responses (co-construction)

- Adjust questioning based on responses (co-regulation)

VANDERBILT UNIVERSITY
MEDICAL CENTER

Managing Challenges

- Set clear expectations for participation at the start of the session
- Short or non-committal responses
  - Start simpler
  - Rephrase
  - Ask for reasoning
  - Use hypothetical questions (What if..., What might...)
- Silence --> allow time
  - o Prompt with scaffolding
  - o Don't answer your own questions
  - o Step back and ask Wonder questions
- Overly complex answer --> refocus on key learning point(s)

Other Types of Questions

- Kickstart question
- What if....
- Challenge questions
- Wonder questions
- Summative questions
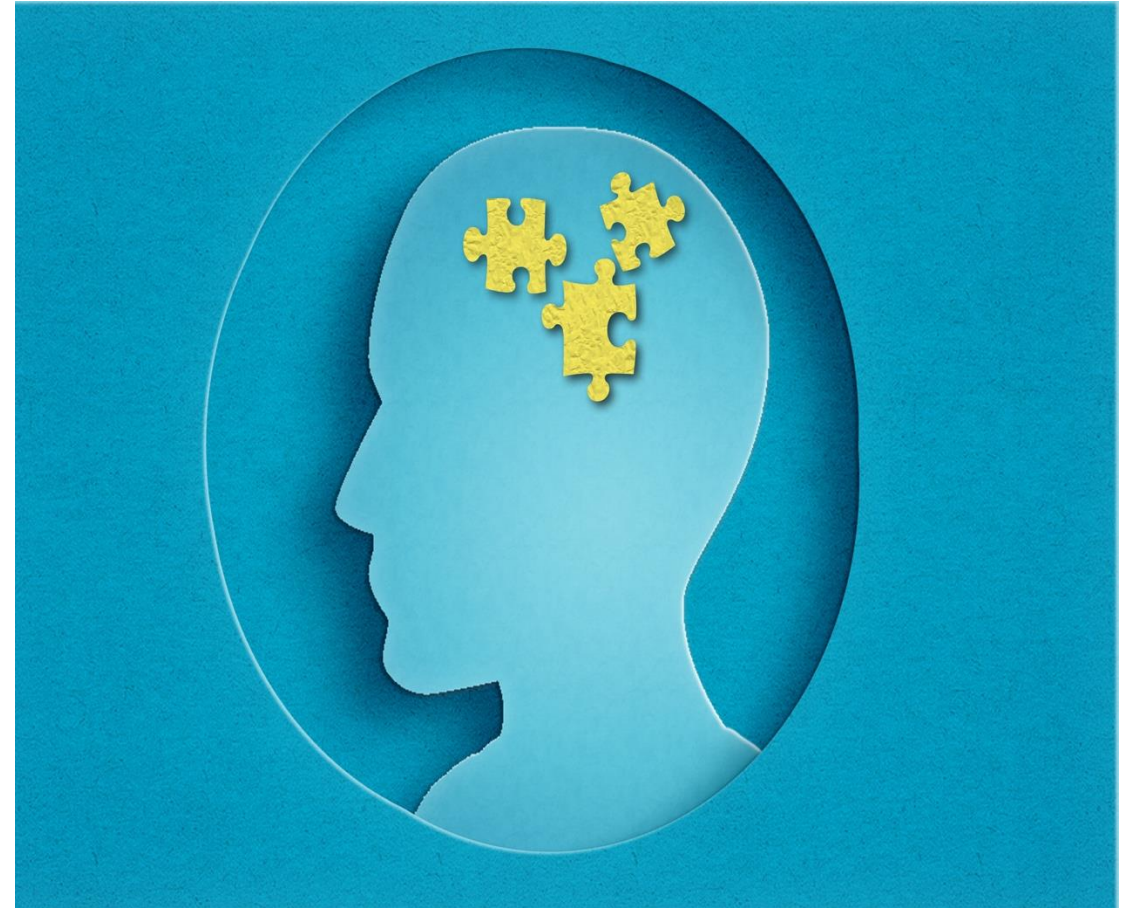
Tips for Effective Questioning

- Don't answer your own questions
- Wait for an answer (~5-20 seconds)
- Listen to the answer, don't interrupt
- Encourage the learner even if they are wrong...be curious
  - "That's interesting. What makes you say that? How did you arrive at that recommendation and plan?"
- Think about the sequence of your questions and number of questions
  - Change the level of cognitive demand (balance types of questions)

Metacognitive Moment: Reflection

- Reflect on when
  - When do you typically use questions as a teaching tool

- Reflect on what
  - What topics/content do you typically ask questions about?
  - What types of questions do you typically ask?

- Reflect on how
  - How do you typically ask questions?

Commitment to Change

- Asking good questions can become a habit
- What is one thing you plan to do differently the next time you are about to ask a learner a question?

Questions

Shared references/resources

- The Coaching Habit: Michael Bungay Stanier

- Effective Questioning Techniques – Brookfield, S. D., & Preskill, S. (2016). The Discussion Book: 50 Great Ways to Get People Talking.

- Questioning for Critical Thinking – Paul, R., & Elder, L. (2013). The Thinker's Guide to Socratic Questioning.

- Medical Education and Active Learning – Harden, R. M., & Laidlaw, J. M. (2020). Essential Skills for a Medical Teacher.
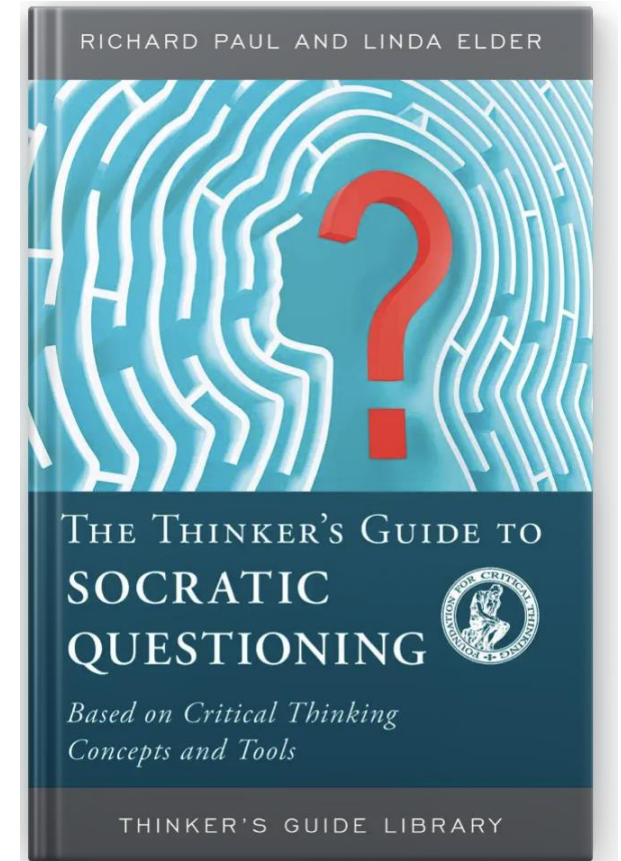
Thank you!

Kendra.Parekh@vumc.org
Janice.Law@vumc.org