

*Welcome to*  
**Helping Students Thrive in Geoscience  
at Two-Year Colleges: Selected  
Strategies**

Please introduce yourself to others at your table.

Eric Baer, Highline College

Norlene Emerson, University of Wisconsin - Richland

Adrienne Leinbach, Wake Tech Community College



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**SAGE 2YC**



*2yc Faculty as Agents of Change*



# SAGE 2YC

## *2yc Faculty as Agents of Change*

► This site is part of NAGT's Exemplary Sites collection.

The **Supporting and Advancing Geoscience Education at Two-Year Colleges** (SAGE 2YC) project and website helps two-year college geoscience faculty implement high-impact, evidence-based instructional and co-curricular practices at their own institutions that will lead to improved STEM learning, broadened participation, and a more robust STEM workforce.

What do you want to do?



### Support 2YC Students

Provide students with tools to help them be successful in college and beyond.



### Sustain Faculty Learning

Find and share materials that provide continued learning opportunities for faculty.



### Make Change Happen

Catalyze meaningful, positive change at the departmental, institutional, or regional level.

### Other Options



Student Resources



SAGE Musings Blog



Workshops and Events



Change Agent Teams



Project Workspaces



About SAGE 2YC

<https://serc.carleton.edu/sage2yc/index.html>

# *Short Course Goals*

- Share information on strategies that support the academic success of 2YC students in the geosciences
- Explore strategies that help students develop their science identity and ways to infusing geoscience career information into your teaching
- Share strategies for supporting transfer students in their pathways from 2YC to 4YCU at the department, program, and institution level.
- Share and learn from others, increasing communication and collaboration of those interested in helping students thrive in geoscience at 2YCs



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# Short Course Overview

**8:30-8:45** – Welcome, introductions, workshop goals

**8:45-10:15** – Supporting Student Success in your Teaching: Active Learning

**10:15-10:30** - Coffee Break

**10:30-11:45** – Helping Our Students Develop a Science Identity & Infusing Geoscience Career Information into Your Teaching

**11:45-1:00 lunch**

**1:00-2:30** - Supporting Students through the 2YC-4YCU Transfer Process at Department, Program, and Institution Level

**2:30-2:45** - Coffee Break

**2:45-3:55** - Small Group Discussions on Strategies to Support Geoscience Students

**3:55-4:20** – Reflections, Action Plans, and Sharing

**4:20-4:30** - Closing remarks and Evaluations

[https://serc.carleton.edu/sage2yc/workshops/GSA17\\_thrive/index.html](https://serc.carleton.edu/sage2yc/workshops/GSA17_thrive/index.html)

# Supporting Student Success in your Teaching: Active Learning Methods

## Session Goals

- Learn more about various active learning strategies and teaching practices that support student success
- Consider what you might want to implement in your teaching

### Think-Pair-Share

**What it is:**  
A thought-provoking question is posed to students who think about the answer then discuss it with their neighbors.

**Implementation:**

- Ask a question
- Students think about or write down their answer (usually 1-2 minutes)
- Students pair up
- Students share their thoughts with each other and discuss the answer
- Instructor can ask for responses from some, all, or no pairs

**The question:**

- Promotes student engagement
- Facilitates informal assessment

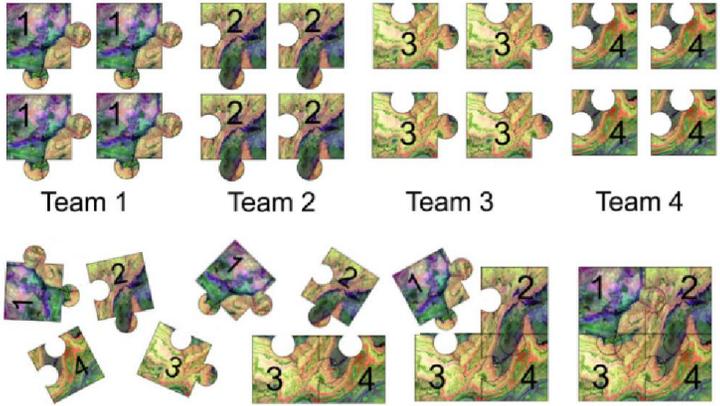
**Examples include**

- **Image Interpretation:** Interpret the geologic history of the rocks shown in this image.
- **Graph Interpretation:** From the plot of weathering depth vs. age for limestone in tombstones, estimate the mean weathering rate.
- **Open-ended question:** How do we know what the climate was like before people started keeping track?
- **More examples at:** <http://serc.carleton.edu/16225>



*Think individually*      *Form small groups and discuss*      *Share with larger group*

### Active learning method: Jigsaw



Team 1      Team 2      Team 3      Team 4

From Barbara Tewksbury  
[http://serc.carleton.edu/NAGTWorkshops/teaching\\_methods/jigsaws/index.html](http://serc.carleton.edu/NAGTWorkshops/teaching_methods/jigsaws/index.html)

## STUDENT ACTIVITY AND LEARNING

*A traditional science instructor concentrates on teaching factual knowledge, with the implicit assumption that expert-like ways of thinking about the subject come along for free or are already present. But that is not what cognitive science tells us. It tells us instead that students need to develop these different ways of thinking by means of extended, focused, mental effort.*



C. Wieman, Nobel Prize winner,  
Change, 2007, Sept/Oct, p. 9-15.

# Student Retention Rate over 24 hours from different teaching methods

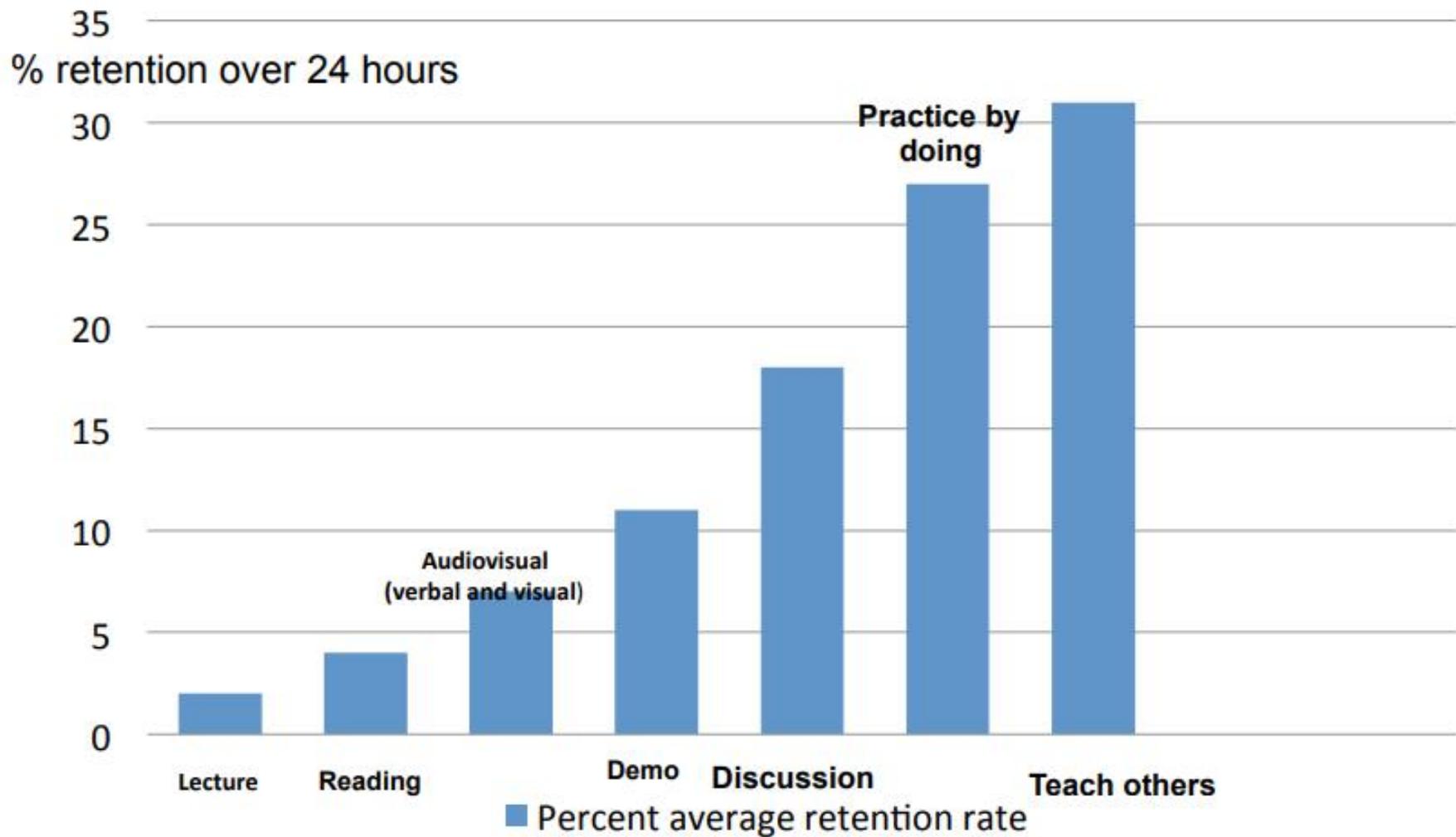


Chart made from data in Sousa 2006. How The Brain Learns. Fig 11.1 in Barkley 2010. Student Engagement Techniques

# WHAT DBER TELLS US ABOUT STUDENT LEARNING

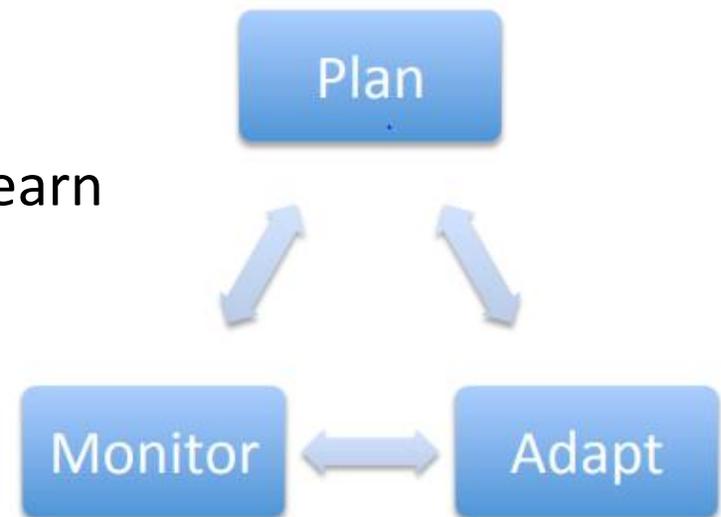
1. *Students learn key concepts better when they actively monitor their understanding in a variety of activities inside and outside of class (designed, structured activities).*
2. *Students become better learners when we challenge them to answer questions that require the use of higher order thinking skills.*
3. *Knowledge is socially constructed and people learn best in supportive social settings (e.g., in small collaborative groups).*
4. *Most students rely on ineffective learning strategies and are unaware of more effective techniques.*

Classes that support research-validated teaching strategies may be described as “reformed or student-centered or inquiry-based or active learning environments”

# Active learning supports metacognition

Three basic steps to teaching students metacognition:

1. Teach students that their ability to learn can be changed.
2. Teach planning & goal-setting.
3. Provide students opportunities to monitor and adapt their learning.



Summarized from Lovett, 2008, Educause Learning Initiative Conference

<http://serc.carleton.edu/NAGTWorkshops/metacognition/index.html>

# *Your turn: Jigsaw on Active Learning Part 1*

**Count off 1-12. Move to the poster that corresponds with your number and read the poster.**

**(2 sets of posters: 1-6 & 7-12)**

**Talk to your poster team members: (you have 20 min)**

How you would summarize the method to others?

When would this technique be especially useful?

For what courses/topics might the technique not work as well?

How much preparation before class does the technique require?

Could you make this technique work with an online course, if so how?

## *Your turn: Jigsaw on active learning Part 2*

**Return to your table & as a group: (40 min)**

Briefly describe each method (teach others)

Rank the methods by time required for preparation

What are 3 different active learning methods that could be used to help students interpret graphs?

Which activities work well for online courses and how would you design the activity for an online course?

# Reflection

- What ideas from this session are potentially useful for your teaching?
- Why?
- Which of the active learning strategies is likely to give you the biggest “return on investment” – i.e., have the highest impact on student learning- while still being manageable?



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