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Small Teaching: Everyday Lessons From The Science Of Learning
September 12, 2018
10:00 AM - 12:00 PM * Lib 127
Goal

- The goal of this presentation is to:

- Compare the small teaching techniques of retrieval, predictions, interleaving, connecting, practicing, and self-explaining.
Criteria for inclusion

- Based on evidence from the learning sciences
- Real-word application (preferably higher education)
- Personally attempted or directly observed by Lang
Characteristics of Small Teaching

- 5-10 minutes online or in class
- One-time intervention OR throughout the course
- Minimal preparation and grading
- Used in a pinch
How to use the book

- You could:
- Read cover to cover over a break for a big picture view.
- Choose one strategy and experiment with it if the semester is already underway.
- Evaluate and adjust for maximum effectiveness.
Part I: Knowledge Foundation for Learning

- Students studying art and painting characteristics
- 1st group studied similar types of paintings together (massed or blocked technique)
- 2nd group studied one type then another type (mixed or interleaved technique)
- 2nd group > scores
- Students would not believe that interleaved study really worked
Biases

What do students do when you tell them to study for a test? Or how do you tell a student how to study for a test?

Even if students know research about best ways to study, they are still likely to keep doing what they have been doing.
Study Results

- A brief ungraded quiz with answers shown afterwards
  - Start of class
  - End of class
  - Before an exam
- Increased grades by a full letter grade and persisted 8 months
- Students solved a problem at end of class
  - One copy for teacher, one copy to keep
  - Feedback next class
  - Failure rate dropped from 35% to 17%
- Remembering/retrieving strengthens neural pathways
- More often we remember > stronger connection
Implementation

- Frequent low-stakes quizzes
- Opening questions (oral or written)
- Formative questions at end (Minute paper and muddy point)
- From memory
- Align practice on what is tested on
Summary

- Explain to students why you are using the techniques (FOR all techniques!)
- Helps students stay current with course information
- Deepens learning
- Make better grades
- Have you tried a retrieval technique?
- What will you try?
I Predict...

I predict that...

My evidence is...

Draft Illustration:

Predicting and Pretesting

- Predicting and anticipating creates connections and gives you an emotional boost.
Study Results

- Groups who took pretests scores 10% better on final exams (2 studies)
- Groups who had opportunities to predict content engaged in discussions better than control groups
Implementation

- Pretesting
  - Class, unit, or whole course
  - Same format as actual exams
  - Immediate feedback
  - Write everything they know (KWL)
- Closing predictions for next time
  - Keep conceptual and not specific
- Time to reflect on whether predictions right or wrong
Summary

- Predictions make us curious
- Curiosity can boost memory
Interleaving
Studies

- Math students solving problems with geometric shapes
- 1st group: massed training with one problem then the next
- 2nd group worked on different problems randomly
  - Scored 40% >
- Had skills to identify problem and find solution
Implementation

- Open class with question from previous exam or potential exam
- Create weekly mini review sessions
  - Apply information to a new question
- Make the final cumulative
- Ask questions on major exams from previous course content
- Stagger deadlines and quiz dates (space out)

- Based on spacing out learning
  - Time for consolidation of memories
  - Connecting and organizing prior knowledge
- Retrieving (remembering)
Summary

- Key is time plus mixing and spacing
- Start with blocked then transition to interleaved
- Blocked alone = cramming
- Interleaving improves long-term retention
Part II
Understanding Connecting

- Connections = Comprehension
Remembering/retrieving strengthens neural pathways

More experiences > connections
Study Results

- Psychology students
- 1st group given full set of notes
- 2nd group only outline and headings
- Students performed same on 1st and 2nd exam
- 3rd exam and final. 2nd group did better

- Students who wrote notes had a framework, made connections, and had to formulate the most active thought = > learning.
Implementation

- Find out what the student knows and make any corrections. (pretest or free write)
- Provide a framework or graphic organizer.
  - What have you used?
- Minute paper
- Peer Learning
- Examples from every day
- Metaphors
- Concept maps
Concept Maps

Communication

Health History
1. Biographic Data
2. Source of History
3. Chief Complaint
4. Present Illness
5. Past Health
6. Religion
7. Review of Systems
8. Functional Assessment
9. Pain Perception
10. Meds Reconciliation

Review of Systems
- Skin
- Hair & Nails
- Head
- Eyes
- Ears
- Nose & Sinuses
- Mouth & Throat
- Neck
- Breast
- Rectum
- Reproductive
- CV
- Peripheral Vascular
- GI
- Urinary
- Genital System
- Sexual Health
- MS
- Neuropathy
- Hematologic
- Endocrine

Gathering subjective data about the body systems

Review of Systems
- Patient reports poor night vision
- Patient diagnosed with heart murmur at age 12
- Patient reports normal appetite
- Patient follows gluten free diet for Celiac disease
- Patient reports stiffness in left ankle
Practicing
Study Results

- Musical student novices

Each group had 20 minute lesson

1st group practiced by repetition and rote learning.

2nd group encouraged to try new styles, pay attention to feelings and context

2nd group who were given more mindful instructions were rated more competent and creative and enjoyed the assignment more.
Implementation

- Breakdown major assignments into cognitive skills
- Find class time for practice of skills
- Provide feedback
  - Encourage thinking: Why have you chosen that over the other?
- Give students opportunities to practice skills needed
Summary

- Students should practice cognitive skills in class that you will be assessing.
- Practice includes pausing, reflecting, giving feedback and trying new pathways.
  - Teacher must be present.
- We will not grow unless "...we pause at least occasionally to reflect on what we are doing, why we are doing it, and whether alternative pathways might exist" (p. 134)."
Shift to...

- Value the shift from regular teaching activities (lecturing, leading a discussion) to observing and coaching students as they do the work of learning and giving thoughtful feedback. Students will come to view the classroom as a place for “...active, mindful practice of intellectual skills” (p. 136).
Self-Explaining
Study Results

- 3 similar studies demonstrating students who used self-explaining did better
- Chiu and Chi (2014) reviewed studies found
- Self-explaining allows students to face and correct flaws in thinking
- Fills in gaps in problem solving process

- Banning (2004) tried and recommended the "think aloud approach" with nursing students
- Assesses student's ability to clinically reason
Implementation

- At points in the problem-solving process, allow students to select the right principle to use before they go to the next step. Acts as a pause and reflection.
- Ask, Why are you doing that? using that technique?
- Use peer instruction: answer, pause, explain to neighbor, and revise answers
- Use class time to practice skills and explain while practicing
- Prompt to use prior knowledge as they explain
- Think out loud
Summary

- Monitoring comprehension is key
- Connects theory with practice
Discussion

- What strategies are you using now?
- What do you plan to use?
- Is your final exam cumulative?
- Do you use pretests?