
Test-Enhanced Learning: A New Twist on Testing in Nursing Education

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April 2026

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TESTING



Objectives:



Following this session, participants should be able to:

1. Define brain-based components and practices associated with test-enhanced learning, while framing test-enhanced learning within selected best practices in brain-based teaching and fostering clinical judgment.
2. Examine the benefits of test-enhanced learning for nursing students and nursing education.
3. Identify strategies to implement test-enhanced learning in classroom, clinical, laboratory, and simulation settings.

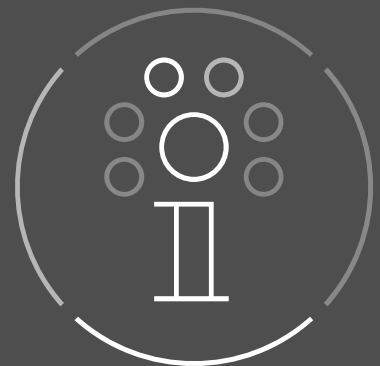
The purpose of tests...

- Measure and promote learning (curriculum effectiveness)
- Meet our legal responsibility to prepare competent healthcare professionals
- Determine readiness for licensure/certification
- To differentiate learners—how well are they learning?
- Incentivize students to study
- Summative assessment
- So, we NEED to ensure our tests encourage DEEP, HIGH-LEVEL thinking!
- The goal is to assess the student's clinical decision-making skills—test a nurse's thinking, not a student's knowledge

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What is test-enhanced learning?

**TESTING IS A
TEACHING
STRATEGY!**



A formative assessment and teaching strategy....

- Testing
- Quizzing
- Remediation

For personalized learning plans and improved educational outcomes

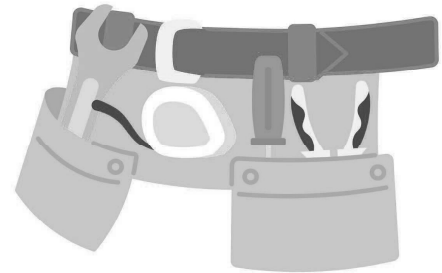
Validating in Brain-Science



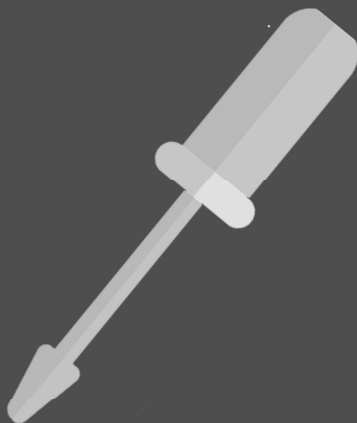
Please get out your worksheet!

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- ✓ Test-Enhanced Learning
- ✓ Practice Retrieval
- ✓ Spaced Retrieval
- ✓ Calibration
- ✓ Elaboration/Reflection



Test-Enhanced Learning



A New Twist

- Information processing theory
- Enhances
 - Immediate learning-Short term memory (STM)
 - Retention -Long term memory (LTM)
 - Rehearsal/Transfer-working to LTM
 - Retrieval/Recall-LTM to working
- More valuable to produce (context-rich) versus recognize (context-free)-*NGN/Clinical Judgment NCLEX®*
- *Tightens clinical judgment skills*

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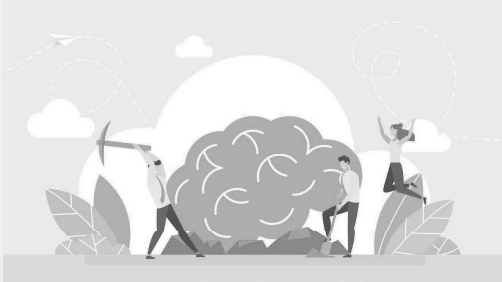


Practice Retrieval

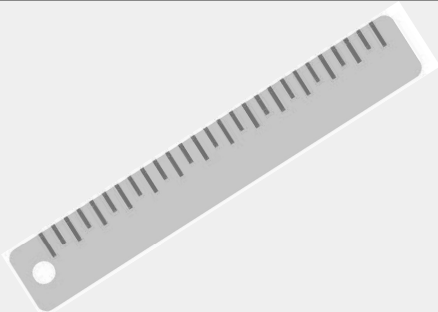
- Have students remember (retrieve) information often-build/revisit within a shorter time frame/frequent/more often
- Foster thinking/ desirable difficulties/effort
 - If it is too easy, we don't feel like learning it!
 - If it is too hard, we get discouraged!
 - Promotes retention
- More effective than re-studying/studying/exposure-neuroimaging validates connectivity

• Methods

- ✓ Prep for class/Admit tickets (priming effect)
- ✓ Pre-class/frequent quizzes
- ✓ Quick writes
- ✓ Muddiest Parts
- ✓ Unfolding/building cases



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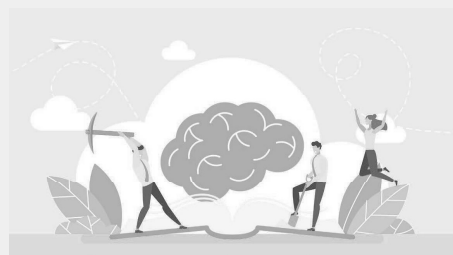


Spaced Retrieval

- Students exert effort to remember over time-strengthens memories/easier to retrieve over time
 - Distributive practice effect/long term potentiation
 - Testing effect
 - Promotes retention (testing effect)

• Methods

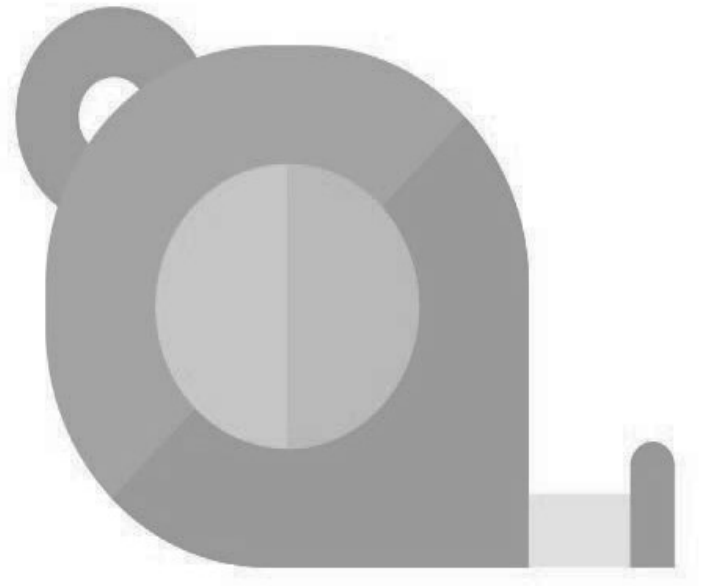
- ✓ Build throughout and between semesters
- ✓ Build, rebuild, build upon
- ✓ Unfolding/Building cases
- ✓ Adaptive Quizzing/Self-Quizzing
- ✓ Testing
- ✓ Standardized Testing



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Calibration

- Measure what we know and what we don't know
- “Illusion of fluency”
- “Illusion of knowledge”
- “Cognitive bias”
- Self-regulated versus self-confident
- Methods
 - Tests
 - Quizzing/Adaptive Quizzing
 - Self-evaluation/self-quizzing



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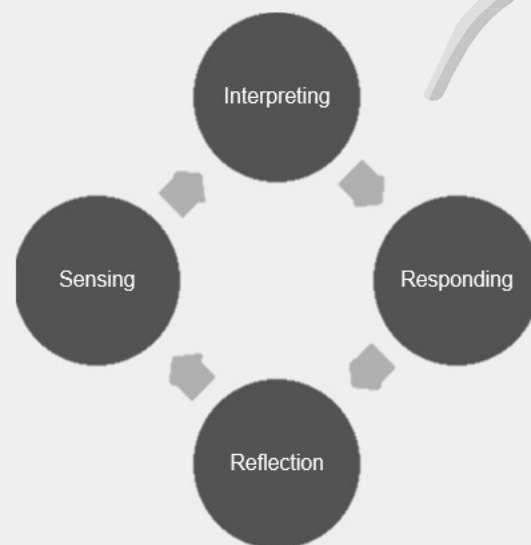
Elaboration

- Reflection: “Thinking about Thinking” and deepen personal understandings
- Elaboration: Adding layers/complexity/perspectives to learned content/applied to different clinical contexts (situated cognition)

• **Methods**

- ✓ Self-evaluation/regulation
- ✓ Socratic questioning in all settings
- ✓ Rich, contextual questions add layers to previous understandings

Reflection



The Evidence-Base for Test-Enhanced Learning: What does the literature say?



The Right Thing to do- Best Practices

- Learning/content mastery, retention, and information transfer
- Student perceptions of learning
- Student attendance and engagement
- Exit exam, test scores, and grades
- Ability to transfer and apply knowledge to clinical situations, at the bedside and in case exercises
- Effectiveness of NCLEX® review and preparation
- Student retention and program completion
- Student confidence
- Student satisfaction with the program
- Student motivation to study and time spent efficiently studying

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Test enhanced learning...



- Student anxiety
- Resistance to individualized/ focused remediation practices
- Program attrition
- Complaints about or lack of motivation in response to student-centered instructional methods
- Faculty burden by shifting to student-centered roles and responsibilities for learning
- Bias in education and remediation strategies by increasing objectivity of student strengths and learning gaps
- Fixed-mindset behaviors while encouraging growth-mindset strategies¹⁸

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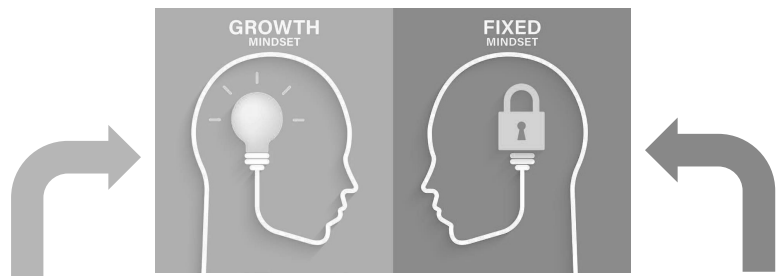
A deeper look at the evidence...



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- Better than time spent studying, reading, or re-studying (Binks, 2018; Ven Hoof et al., 2023)
- Builds clinical reasoning, clinical judgment, and application to real-world problems (Eastridge, 2019; Raupach et al., 2016)
- Effectiveness of frequent quizzing, adaptive quizzing (Sartain & Wright, 2020; Simon-Cambell & Phalan, 2016; Presti & Sanko, 2018)
- Enhances engagement and motivation (Emblemsvag, 2024; Green et al., 2018; Gupta et al., 2022; Van Hoof et al., 2023)
- Especially valid for lower performing students who tend to over-estimate their abilities (Yu-Ching et al., 2017)
- Assist in lowering text anxiety and enhance performance in students with high levels of anxiety (Messineo et al., 2015)
- Feedback critical - delayed or not-formative not necessarily summative (Nelson, 2024; Ryan et al., 2023).
- Consider cognitive load and mindset (Nelson, 2024; Ryan et al., 2023).

Fostering Learning: Mindsets



Growth Mindset

- Improving competence
- Perseverance, resilience, and adaptive
- Feedback = growth “power of not yet”
- Praise for effort, not intelligence
- Engage in a belonging/learning community
- “Not yet” replaces unsatisfactory on rubrics

Fixed Mindset

- Proving competence
- Poor self-concept
- Lack of success
- Fear of failure
- Avoid challenge and making errors
- Do not remediate
- Feedback response = defensive

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A great example....

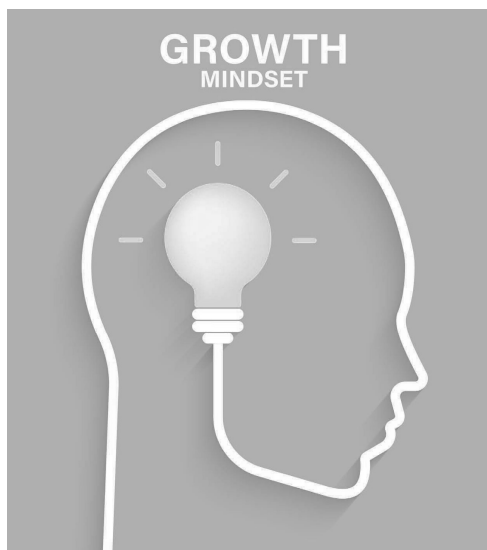


- Several students in a test review become angry going through answers.
- The students start to become agitated—one says, “*your tests are so hard!*” Others state “*you never ask the questions I expect,*” and “*I do great on the quizzing app but your questions are unfair.*”
- What do you do?
- What would you say?
- THINK-PAIR-SHARE: INVENTED DIALOGS

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Stimulate a growth mindset



- Find your own mindset
- Teach about the brain and learning-grows and changes
- Emphasize effort, not ability or achievement
- Present as a mentor, not an evaluator
- Beware of stereotypes or biases
- Explain that tests measure current knowledge, not potential to achieve in the future
- Discuss growth that happen in clinical may, or may not, parallel classroom learning
- Address how staff many impact and be impacted by mindsets

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Making it Work

-> Class

-> Clinical

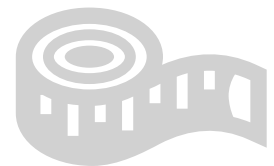
-> Lab/Sim



- ✓ Formative Use of Testing and Quizzes
- ✓ Pre-Engagement
 - ✓ Pre-Class Quizzes
 - ✓ Prep for Learning Sessions: Admit Ticket/Exit Ticket
- ✓ Engagement
 - ✓ Testing
 - ✓ Pair/Group/ Individual Activities
- ✓ Post-engagement
 - ✓ Adaptive Quizzing
 - ✓ Self-Quizzing
- ✓ Socratic questioning
- ✓ Gaming
- ✓ Skills practice
- ✓ Debriefing
- ✓ Programmed instruction
- ✓ Testing games
- ✓ Interactive quizzing
- ✓ Flash cards

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In-Class Test Questions



The client is assessed 24 hours after an acute episode of pulmonary edema. Which findings would suggest an improvement of the cardiac output? **Select all that apply.**

1. Urinary output of 100 mL over last 8 hours.
2. Blood pressure increasing from 98/58 to 123/69 mmHg.
3. Heart rate decreasing by 23 beats per minute.
4. Lessening of restlessness and disorientation.
5. B-type Natriuretic Peptide (BNP) of 356 μ /dL
6. 3+ pitting edema in lower extremities



Class Exercise: Write the key and distracters...Good Place to start!—
Writing test questions, Clinical Judgment Cases and items, etc.

The nurse cares for a client being treated for fluid volume deficit. Which information is critical to include in the teaching plan?

- 1.
- 2.
- 3.
- 4.



Progressive Quizzes

Progressive Quiz

¼ piece of paper—
PUT YOUR NAME ON IT!

QUESTION 1

Think of someone in your life who was a good leader. In two-three sentences, describe why that person was a good leader.

QUESTION 2

When you graduate from UD, you will be looking for a job as a registered nurse. Would you rather work for a person who is a leader, manager, or both? Explain your choice in two to three sentences.

QUESTION 3

Think of the 5 leadership styles we just discussed. If you could choose, which style would you like to work for? For which style do you believe you would be most productive? Are they the same? Explain your answers in two to three additional sentences.

QUESTION 4

- Describe a specific situation in which leadership skills were an important part of a political situation.

Question 5

- Consider a change you had to did make in your life. Use two words on the previous slides describe they type of change you have in mind.

Question 6

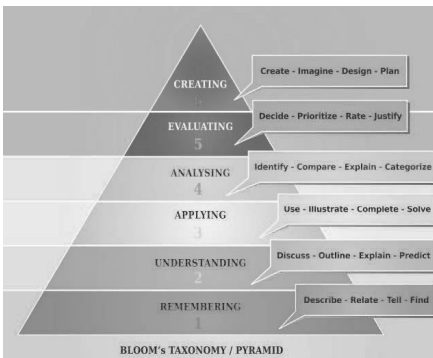
Identify one restraining force and one facilitating force for the change you identified in Question 5

Group Tests



- Develop a test as an “in-class” exercise
- Have students work in groups of 3-5 participants
- Come to consensus why the correct answer is right
- Then, discuss why the other distractors are incorrect
- Great for questions related to prioritizing
- Assesses class knowledge AND develops test-taking skills

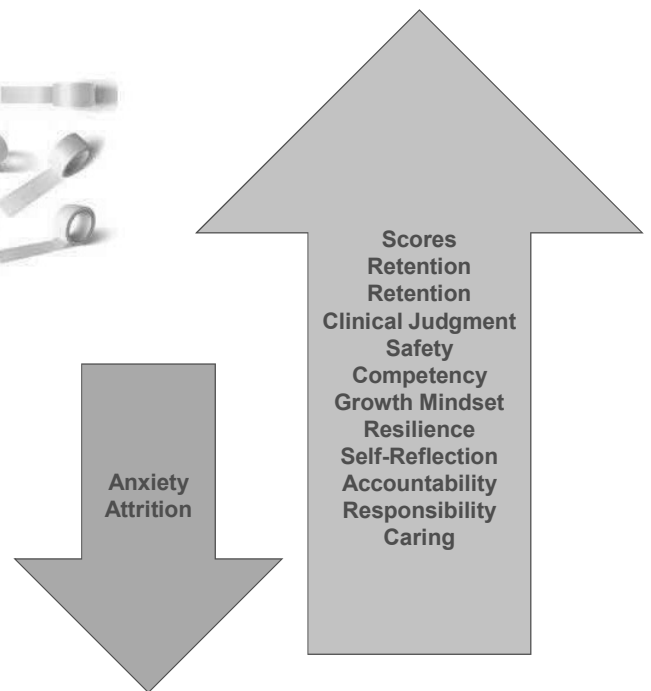
Collaborative Testing



- Students take the test
 - Tests are handed in
 - Students are placed in random groups
 - Students take the test again, as a group
 - Students are provided points based on their scores
-
- For example:
 - Students get a “A” -2 points on the test
 - “B”-1 point on the test
 - “C”- 0.5 points on the test
 - Several models for this method

The Power of Remediation

- Student-Driven
- Deep Learning
- Active
- Identify Gaps
- Mandatory/All students
- Timely
- Reflection
- Clinically Focused
- Student v. Faculty Roles
- Independent v. Group
- Early and Often
- Handwritten
- Facilitated Debrief



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Cognitive Wrappers/Exam Wrappers

- Students
 - Predict their exam scores/study strategies/level of effort
 - Compare their actual score with the anticipated score
 - Correlate their effort with actual performance (begin to see that effort links with performance-not busy work)
 - Make plans for future studying
- May be used with homework, class, clinical, all assignments as a method of debriefing



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Recommendations



- Consider application of test-enhanced learning in your classroom, clinical, lab, and simulation
- Share these findings with fellow faculty for curricular application
- Effective across diverse ages/populations
- Teach students about brain-based learning: Valuable work for deep learning vs. busy work
- Incremental Changes for personalized learning

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- Your personal plan-
Think-pair-share



Thank you!

