Ten Proven Teaching and Learning Strategies for the Classroom and Experiential Settings

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At the conclusion of this activity, participants should be able to:

1. Describe ten proven teaching and learning strategies.

2. Cite specific examples for each teaching and learning strategy.

3. Discuss how these strategies can be applied to your classroom and experiential educational activities.
Ten Proven Teaching and Learning Strategies

1. Prior Knowledge
2. Metacognition
3. Retrieval practice
4. Spaced practice
5. Interleaving
6. Elaboration
7. Personalization
8. Scaffolding
9. Distinctiveness
10. Peer teaching
“Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn” – Herbert A. Simon
Prior Knowledge

• All new learning is built on what students already know.

• Involves the transfer of available knowledge from long-term memory to working memory.

• Results in higher recall and better understanding of new information.

• Success depends upon if student’s foundational knowledge is shaky versus solid.

Activating and Using Prior Knowledge

• Talk to colleagues in other courses.

• Use minor prompts and simple reminders to indicate when and where students have heard the content before.

• Collect base line data on students understanding of your content.
  – Assessment activity such as quiz or activity in lab or rotation.
  – Think-Pair-Share, asking students to generate relevant knowledge from previous courses or their own lives.
  – Create a list of concepts and skills that you expect them to have coming into your course.
  – Have students rate using a Likert scale: Very Poor; Poor; Fair; Good; Very Good
  – For example, How would you rate your ability to describe the key differences between benign and malignant tumors?

• Assign a concept map.
  – It can be used to introduce a topic, finding out what students already know and providing a framework for studying the topic.
  – It may be teacher organized, teacher and student organized, or student organized.
  – It can be used individually, in pairs or small groups.
Application of Prior Knowledge - Concept Map

CANCER - MIND MAP

- Local effects
- Systemic symptoms
- Metastasis

- Chemicals
- Diet and exercise
- Infection
- Heredity

- Breast cancer
- Brain cancer
- Cervical cancer
- Heart cancer

- Lung cancer
- Colorectal cancer
- Prostate cancer
- Esophageal cancer

CANCER

Signs & Symptoms

Causes

Types
• Metacognition is what we know about what we know.

• Metacognition includes a critical awareness of one’s thinking and learning AND oneself as a thinker and learner.

• Helps students become aware of their strengths and weaknesses.

• Increase students’ abilities to transfer or adapt their learning to new contexts and tasks.

Application of Metacognition

• Exam Reviews

• Metacognitive Questionnaires
  – Having learners evaluate their learning is powerful and can lead to change for future learning.

• Reflection Exercises
  – Using the “Muddiest Point”

• Mastery Goal Setting
  – “I want to learn as much as possible from this rotation.”

• Questioning and Feedback
  – Questions related to planning, monitoring, and evaluating.
  – Questioning should be Socratic and developmental.

• Clinical Documentation with Explanation
  – SOAP notes may include documentation of rationale and resources.

Additional Tips for Using Metacognition

• Teach students how their brains are wired for growth.
• Give students practice recognizing what they do not understand.
• Provide opportunities to reflect on coursework.
• Have students keep learning journals.
• Consider essay vs. multiple-choice exams.

Medina MS, Castleberry AN, Persky AM. Am J of Pharm Ed. 2017;Volume 81 (4), Article 78.
Retrieval Practice
(AKA “Questioning” or “The Testing Effect”)

- Retrieval practice is a learning strategy that involves recalling facts or concepts or events from memory.

- Retrieval enhances and boosts learning, strengthens long-term memory, and interrupts forgetting.

- A single quiz produces better learning and remembering than rereading the text or reviewing lecture notes.

- The more cognitive effort that is required for retrieval, the greater the retention.

Retrieval Practice

• Tests (or short quizzes) are a means to an end.
  – They promote retrieval, strengthens learning and retention.

• Retrieval practice (testing) in class or online should be low stakes, regular /frequent and delayed.
  – Improves student attendance.
  – Increases studying before class (since students know they will be quizzed).
  – Increases attentiveness during class (if students are tested at the end of class).
  – Students better calibrate what they know and where they need to brush up.
  – Decreases test anxiety.
  – Allows instructors to identify gaps in student’s understanding.

• Students will be much more efficient at evaluating, synthesizing, and applying concepts in different settings if they have the base of knowledge and the retention.

Yang et al, Testing as a Learning Tool, Am J Pharm Educ, Article 7324 (ePub)
Spacing learning over time (AKA “distributed practice”).

- Spacing out studying the same information over multiple sessions.
- When retrieval practice is spaced, allowing some forgetting to occur between tests, it leads to stronger long-term retention and retrieval of key information.

Terenyi and colleagues showed spacing quizzes improved long term retention of brand/generic names compared to no quizzes or massed practice.

Interleaving two or more subjects during practice also provides a form of spacing.

- Interleaved practice feels slower, students can’t easily see long-term benefits.
- Develops your ability to discriminate later between different kinds of problems.

Terenyi J, Anksorus H, Persky AM. AJPE. 2019, 83 (6) 7029; DOI: https://doi.org/10.5688/ajpe7029
Examples of Using Spaced Practice

Classroom Setting:
• Break up lessons into smaller sessions.
• Cumulative cases/testing
• Activating prior knowledge
• Lagged Homework

Experiential Setting:
• Spaced patient cases
• Revisiting prior rotations

Key Points:
• Any spacing is better than no spacing.
• How much time should occur between learning sessions is less critical.
• Space information across multiple days at long enough intervals that encourage challenging retrieval conditions.

Elaboration AKA “Elaborative Interrogation”

- Elaborative interrogation is considered an effective study method and improves student recall of new information.
- Involves asking “how” and “why” questions.
- Elaboration gives new material meaning by expressing it in your own words and connecting it to information you already know.
- Organizing key ideas from new material into a mental model and connecting that model to prior knowledge results in learning complex mastery.

Examples and Application of Elaboration

- Instruct your students to ask themselves “how and why” questions while studying your material.
- Use Images/Mnemonics
- Method of loci - memory enhancement which uses visualizations of familiar spatial environments.
- Elaborative interrogation can be tricky to implement.
- Need to guide students towards the right kinds of questions and give feedback.

http://www.human-memory.net/processes_encoding.html
Personalization
AKA “Self reference effect”

• A form of elaboration where to be learned information is related to self.

• Teaching the relevance of course content can help students develop into engaged, motivated and self-regulated learners.

Examples and Application of Personalization

Utility value
• Refers to the student’s perceived usefulness of the task or activity.
• How the task relates to future goals.
• Helps students to find value in what they are learning.
• Students’ motivation involves expectancies and values. The higher students’ expectancies and values, the more likely they are to try to solve a task.

Utility value assignments:
• Have students write an essay addressing a topic or scenario and discuss the relevance of the concept or issue to their own life.
• Explain the purpose for lessons and assignments.
• Show connections.
• Point out knowledge or skills students are developing.
• Share personal stories.
• Invite community members, preceptors, alumni, former students.
• Model key intellectual traits.
• Show how classroom activities match the instructional goals.
• Show how new learning builds upon prior knowledge.

Examples and Application of Personalization

Goal setting

• Crucial to academic success and helps your student learn important life skills.

• Gets students involved in reviewing their assessment results, sets reasonable goals for improvement, and continues to drive their learning.

• Making goal setting work:
  – Do it often
  – Make it visual
  – Setting a firm end date for achieving it.
  – describe actionable steps and evidence for achievement.
  – Create personal relevance.

• Benefits:
  – Provides a clear path to success
  – Teaches time management & preparedness
  – Increases motivation
  – Measures progress
  – Gives focus & purpose
  – Boosts self-confidence

Leithwood, K. & Sun, J. Journal of Educational Administration.2018;56 (3).
Scaffolding

• Sequencing instruction towards higher goals.

• Start by building on what the learners already know (prior knowledge).

• Add more details and information over time.

• Allow the learners to perform on their own.

• Afterwards, the fading process begins by slowly removing the support in order to give the learners more responsibility.

Collins et al, Am Educator, 1991
Examples and Application of Scaffolding

Classroom Setting
• Breaking down assignments into component pieces.
  – Writing a SOAP note.
• Building complexity over time.
  – Medication order verification

Experiential Setting
• More complex patients over time
• Reduced support over time (move to independence).
Examples and Application of Scaffolding

• Show and tell
• Tap into prior knowledge
• Give students time to talk
• Pre-teach vocabulary
• Use visual aids
• Pause, ask questions, pause, review
Distinctiveness

• “Distinctive processing”
• The processing of difference in the context of similarity.
• Preexisting knowledge enhances memory by facilitating distinctive processing to identify similarities and differences.
• Thinking of differences between two similar things should be easier than thinking of differences between two different things.

Examples and Application of Distinctiveness

• Compare and contrast
  – Compare and contrast the toxicities of paclitaxel and docetaxel.

• Minute paper
  – takes about a minute and used at the end of class or topic discussion to provide rapid feedback.

• Venn diagrams
  – Can be used to visually represent the similarities and differences in toxicities between paclitaxel and docetaxel.
Example of Venn Diagram

Paclitaxel

Myelosuppression
Alopecia
Peripheral neuropathy
Myalgia/Arthralgia
Hypersensitivity reactions

Docetaxel

Stomatitis
Hand-and-foot syndrome
Fluid retention
Example of a Minute Paper

• At the end of a class or instructional time, give students **one minute** to answer **two to three questions** from the following list:
  – What was the most important (significant, crucial) thing you learned in today’s class?
  – What question(s) do you have about the material covered in today’s class?
  – How can I help you learn the concept that is giving you the most trouble?
  – What was the muddiest point in today’s lecture?
  – List the key concepts from today’s class.
  – What question did I ask students today that helped you the most? The least?
  – What examples did I use today that helped you the most? The least?
  – What is the main application of the material we discussed today?

• Collect the anonymous papers, look them over, and report back to the class during the next session.
Peer Teaching

- Student centered design.
- Active role of students (both teacher and learner).
- Reinforces confidence, communication, and presentation skills.
- Instills culture of learning and teaching.
- More open discussion on areas of difficulty.
- Increases enthusiasm for learning.
The Learning Pyramid
attributed to National Training Laboratories Institute

- Listening to lectures: 5%
- Reading texts: 10%
- Seeing & hearing: 20%
- Watching demonstrations: 30%
- Discussing concepts: 50%
- Practice by doing exercises: 75%
- Teaching others: 90%

Average learner retention after 24 hours
Examples and Application of Peer Teaching

• **Team Based Learning**
  – Collaborative learning and teaching strategy.
  – Enables students to follow a structured process.
  – Enhances student engagement and the quality of student learning.

• **PechaKucha - a six-minute, 40-second presentation**
  – Write out a script
  – Use the rule of Three (3 main tips, lessons, experiences)
  – 20 slides using images (20 seconds each)
  – format ensures that the speaker is concise, keeps the presentation moving, and gets through all their content

• **Jigsaw discussion**
  – Builds comprehension.
  – Encourages cooperative learning among students.
  – Improves listening, communication, and problem-solving skills.

• **Fishbowl**
  – a discussion among students in an inner circle surrounded by an outer circle of silent active listeners.
Fishbowl Discussions

- Requires students to retrieve and apply their knowledge.
- Gives students an opportunity to articulate a point of view.
- Deepens their understanding of a topic in relation to other perspectives.
- An occasion to practice and observe conversational approaches they need to master.
Useful Tips to Keep in Mind

• Don’t try to implement all the strategies all at once or all the time.
  – Start with small changes and see how it goes.
  – You can keep making little changes with each iteration of your educational session.

• Explain to students how learning works.

• Teach students how to study.

• Create desirable difficulties.

• Be transparent.

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