Teaching to Learn: The Practical Application of Learning Theory

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Pause and Reflect

• What type of teaching do you do?
  – Environment
  – Number of learners
  – Content (medical knowledge v. skills v. attitudes)

• Which teaching situations are difficult?
Learning Objectives

1. Describe the steps of the learning cycle and match them with their respective neuroanatomic locations
2. Describe techniques for building on learners’ existing knowledge
3. Identify and describe five strategies to increase learner involvement in the learning process including double planning, ratio, cold call, no opt out and right is right
Caveats

• Tested K-12
  • Difference children vs adults
• Data for skills – B
  • NRCT
  • Still impressive
Other Books of Note

• Art of Changing the Brain: Enriching the Practice of Teaching by Exploring the Biology of Learning (ACB)

• Why Don’t Students Like School? (WDS)

• How learning works (CMU)
Overview of the Neurobiology of Learning
(for non-neurobiologists)
The Learning Cycle

Active Testing → Concrete Experience → Reflective Observation → Abstract Hypothesis
The Learning Cycle: An Example

- Active Testing
- Concrete Experience
- Reflective Observation
- Abstract Hypothesis

Hear/See the new word cross-tolerance

ACB 17
The Learning Cycle: An Example

Active Testing

Concrete Experience

Reflective Observation

Abstract Hypothesis

Remember related words images ideas

ACB 17
The Learning Cycle: An Example

- Concrete Experience
- Reflective Observation
- Abstract Hypothesis
- Active Testing
- Generate new words or ideas
The Learning Cycle: An Example

Speak/Write new words or ideas

Active Testing

Concrete Experience

Abstract Hypothesis

Reflective Observation

ACB 17
Neuroanatomy and the Learning Cycle

Abstract hypotheses → Premotor and motor cortex → Sensory and postsensory cortex → Concrete experience

Frontal integrative cortex → Temporal integrative cortex → Reflective observation

Active testing
The Learning Cycle

Active

Concrete Experience

Abstract

Reflective Observation

ACB 17
Thinking and Memory

- Environment
- Facts
- Working Memory
- Long-Term Memory (neuronal networks)
- Procedures

Space

WDS p. 3, 14
Summary

• Learning cycle mirrors neuroanatomy
• Successful thinking relies upon
  1. Environment
  2. Working memory
  3. Long term memory (facts and procedures)
Techniques for Building on Existing Knowledge
“The single most important factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly.”

--David Ausubel
Scaffolding

Build on Learners’ Existing Knowledge

Stories

Working Memory

Long-Term Memory (neuronal networks)

Stories

ACB p. 229, WDS p. 52
Brains Remember Stories

WDS 52
Build on Existing Neuronal Networks

• Ask learner’s peers to describe connections they have made
  – What does this new information bring to mind?
  – What does that make you think of?
• Use metaphor/simile/analogy
• Focus on correct learner response rather than reinforcing wrong information
Build on Existing Neuronal Networks

• Stretch it:
  – Reward correct answer with follow-up question
  – Encourage further reflection/another pass through learning cycle
Summary

• Build on Existing Knowledge
  – Learning builds on prior knowledge, the pre-existing “neuronal network”
  – Medical education should begin with patients (concrete) rather than principles (abstract)
Increase Learner Engagement
5 Strategies to Increase Learner Engagement

• Double Planning
• Ratio
• Cold Call
• No Opt Out
• Right is Right
Excellent teachers plan well

- Double planning: consider what learners are doing while you’re talking
  - Outline with key words missing
  - Write summary statement at pause
  - Re-create diagram in notes
  - Preparing to answer question out loud
Excellent teachers plan well

Ratio: how to get learners to do more of work

- “Unbundle” a question to increase participation
- Half-statements
- Feign ignorance
- Ask “why,” “how,” and for evidence
- Volleyball not ping pong

TLC 65, 92
Ensuring Student Involvement

• Cold call
  – Systematic—increased teaching efficiency
  – Positive
  – Predictable—distributes work fully, authoritatively
  – Scaffolded (easy → hard)
  – Keeps learners accountable—all go through cycle
Cold Call Clip
Ensuring Student Involvement

• No Opt Out: The Moment of “I Don’t Know”
  – Have you noticed moments when you’ve received silence or some form of “I don’t know” and accepted it
  – Don’t let “I don’t know” be the last word
  – Even unwilling/unknowledgeable learners can participate in part of the learning cycle
No Opt Out

• Consider alternative responses
  – “Take a little more time to speak your thoughts. I’ll wait.”
  – “Give it some more thought. I’ll be back.”
  – “Let’s see how you might begin to answer. I’ll come back to you shortly.”
  – “We can work on this problem together. I’ll bring it back to you in a moment.”
No Opt Out Clip
Ensuring student involvement

• **Right is right**
  – Must be precise in answers
  – Close isn’t good enough
  – Build on/correct existing neuronal networks
  – Emphasize high expectations
Right is Right Clip
Conclusion
Learning Cycle Mirrors Neuroanatomy
Build on Existing Knowledge
Ensure Active Learning
Questions?
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References

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One take home point

• Write
• Practice
• Give us feedback
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