Why Don't Students Like School?
A Teaching Book Report

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Nine Principles

- Based in cognitive science
- Universal: true in complicated classrooms
- Big impact on learning
- Large research support
- New applications to the classroom
- Aimed at a pop audience of K-12 teachers

Thinking

Combining information in new ways
Requires:

- Information from environment
- Information in long-term memory
- Procedures in long-term memory
- Working memory

Brains are Intelligently Lazy

- Thinking is:
  - Slow
  - Effortful
  - Unreliable
- Avoid thinking through memory
- Common high-thought tasks get memorized

Brains are Naturally Curious

Solving a problem creates dopamine

- Reward
- Learning

But not:

- Working on the problem
- Knowing the answer

Brain only sees this as "worth it" if:

- Not too easy
- Not too hard

Implications for the classroom

Pay attention to the cognitive work students will be doing

- Too much/too little opportunity to disengage
- What happens if students aren't successful in problem solving opportunities?
- Do students have the necessary information in long-term memory that the problem is interesting, but doable?
  - Keeping useful information on the board can reduce cognitive load
- How familar are students with the necessary background to solve a problem?
- (Neurodiversity can add additional cognitive load)

Implications for the classroom

- Keep students' interest with questions, not answers
- Pose questions after students have the desired background
- Adapt work level for individual students
- Changing topics will regain attention
- Keep a record to fine-tune lessons to students' levels

Reading Comprehension

Knowledge is essential to reading comprehension

- Know what words mean
- Writers don't spell out every last detail

Chunking

Background knowledge allows us to group commonly grouped pieces of information together:

- Saves on working memory space
- Easier to connect in new ideas
- Chunk problems with solution techniques

Implications for the Classroom

- Evaluate knowledge to be taught by whether it will form connections
- Establish background knowledge before requiring critical thinking
- Knowledge acquisition through reading, other incidental sources is very important
- Knowledge sticks when it can be chunked with other connected pieces of knowledge

How to induce long-term memory?

- Long-term memories must start in short-term memory
- Strong emotions can improve memory
- Repetition isn't enough
- Wanting to remember isn't enough
- Artificially working in students' interests risks distracting them from the connections they should be making

Memory is the Residue of Thought

What aspects get remembered are what gets processed

- The specific look of a penny does not get processed when using them as change
- Thinking about the meaning of words improved recall versus determining if they had an A or Q.
- Word recall improved when hints matched aspect of a word's meaning which was originally presented

How to Get Across to Students

Story Structure:

- Good stories engage the audience at an ideal level of problem-solving: filling in the gaps of the story
- Provide information necessary to fill in the gaps:
  - Causal
  - Character motivation
- This filling-in-the-gaps thought process produces memories

So:

- Organize lessons to form good stories
- Spend lots of time setting up the question of the lesson

Implications for the Classroom

- Evaluate lessons by thinking through students' thought processes
- Make sure meaning is part of those thought processes
- Be careful with attention-grabbers: can distract from the lesson
- Be careful with discovery learning: students learn wrong lessons without immediate feedback
- Organize lessons around the questions

Forming Connections

We learn and understand new concepts by connecting them to concepts we're already familiar with.
To teach:

- Bring up concepts from long-term memory
- Point out relevant perspectives on those concepts
- Make connections
- Repeat
- Connect examples to the abstraction

More interconnections = deeper knowledge

Implications for the Classroom

- Give students examples to compare and connect
- Emphasize deep knowledge explicitly in the classroom and on assessments/assignments
- Deep knowledge requires tons of connections; be realistic in student expectations

Benefits of Review after Proficiency

- Helps cognitive processes become automatic
  - Reducing load on working memory
  - Allowing for more advanced reasoning
- Prevents forgetting (space out review for best results)

Implications for the Classroom

- Practice is boring, so just focus on what needs to become automatic
- Space out practice
- Include practice in more advanced subjects

Cognition of Experts

- Can identify importance of details
- Can transfer to similar domains
- Memory/thought based on functional structure
- Common skills become automatic

How to Become an Expert

About 10 years of practice

Implications for the Classroom

- Getting students to think like experts right away is unrealistic
- Focus on learning topics and how fields work, not creating knowledge
- Think carefully about expert activities and what students will actually take away from them
- The path to expertise is not direct: early practice may look different

No Strong Evidence for Learning Styles

People differ in their ability to remember different types of information, but adjusting how information is presented doesn't seem to improve retention

Implications for the Classroom

- Focus on how material is best presented
- Change modes to keep students' attention and let them practice different mental processes, not to match learning styles
- Don't see value in intelligence: it implies lack of intelligence makes a person less valuable

Intelligence Research

- Correlation between different types of intelligence tests (called g)
- But stronger correlation among intelligence tests of the same type (verbal, mathematical, etc. intelligence)
- Genetics seem to play a large role in intelligence
- Probably due to feedback loops: environment also seems to play a large role in intelligence

Growth Mindset

- Students who believe that intelligence is malleable get higher grades because they put in the work
- Students who believe that intelligence is immutable may avoid putting in the work because they feel it makes them look unintelligent
- How students are praised affects how they think about intelligence

Implications for the Classroom

- Praise effort, not ability
- Provide explicit instruction on importance of work
- Embrace failure as part of the learning process
- Make sure students have necessary study skills
- Catching up is a big task: set smaller goals
- Hold students to high standards to demonstrate confidence in them

Practice and Feeback

- Reduces load on working memory, builds long-term knowledge
- Practice requires knowledgeable feedback
  - Tape your classes, observe
  - Compare tapes of third party classes with a partner to practice feedback skills
  - Reflect together on your own tapes
  - Slowly bring back insights into your practice

Self-Management

- Plan for increase in work as you break from routines
- Plan for increase in time spent
- Take it slow

Smaller Steps

- Keep a teaching diary
- Start a discussion group with fellow teachers (social and problem-solving)
- Observe students' peers outside of the classroom

"Let me take you on a mental journey. Follow and trust me. The path may sometimes be rocky or steep, but I promise a rewarding adventure."

"Most of [teaching] is anticipating how your [students] will react"