How do we learn best

Overview

Understanding how human brains learn can **help teachers** to employ more effective **teaching** methods.

- 3 types of memory – how do we effectively use this for maximum learning
- Define cognitive load
- Define cognitive overload and discuss methods for minimising this
- Chunking learning
- Scaffolding learning

Information processing

Information Processing Theory is a cognitive theory that focuses on how information is encoded into our memory. The theory describes how our brains filter information, from what we're paying attention to in the present moment, to what gets stored in our short-term or working memory and ultimately into our long-term memory.

Four types of memory

- **Sensory memory**
  - acquires the information coming in through the senses and is the first stage of Information Processing Theory. It refers to what we are experiencing through our senses at any given moment. This includes what we can see, hear, touch, taste and smell. Sight and hearing are generally thought to be the two most important ones
- **Short term memory**
  - Short term memory is memory that holds about 7 items for about 30 secs without rehearsal or review
- After this it is either committed to long term memory or forgotten altogether
- **Long term memory**
  - Long-term memory refers to the storage of information over an extended period. If you can remember something that happened more than just a few moments ago, whether it occurred just hours ago or decades earlier, then it is a long-term memory.

- o This information is largely outside of our awareness but can be called into working memory to be used when needed
- **Working memory**
  - o is the system where we temporarily store information so we can manipulate it to perform cognitive tasks like comprehension and reasoning. It also helps us stay focused on tasks, block out distractions, and make sense of the multiple pieces of input going into our brains at one time
  - o Working memory is the bottleneck in learning
  - o If working memory becomes overloaded then meaningful learning will not occur. Our job as educators is to figure out how to make the best use of working memory and help learning make it to long term memory and stick

Forgetting

- As educators we need to figure out how to aide the learner in slowing down the forgetting process

- Memories weaken over time

- The biggest drop is soon after we learn something

- Without review or reinforcement, our ability to retain information plummets

- Easier to remember things that have meaning

How do we enhance memory retention

- Start with an overview of the material

- Present the material in order of complexity

- Chunk information

- Revisit critical info

- Encourage reflection

- Use spaced learning – distributive practice

- Overlearn

- Make learning meaningful, relevant and purposeful. Establish a strong reason for retaining it.

- Keep challenging your memory

- Repetitive practice

Cognitive load

- Cognitive load - Amount of mental resources needed to accomplish a task
- Familiar topics or simple tasks do not require much cognitive effort and the load is relatively light
- New tasks or difficult concepts take more cognitive effort

Cognitive overload

- Is the situation in which the demands placed on a person by mental work (the cognitive load) are greater than the person's mental abilities can cope with
- $10 bill analogy – driving in your local suburb versus driving in a foreign city
    - If you are really familiar with your surrounds when driving, you only spend a few dollars worth of your attention and can carry on a conversation or listen to the radio or follow directions quite easily. You have spare cognitive load to spend
    - If you are driving in a foreign city, in an unfamiliar car and driving on the opposite side of the road, you are already using a lot of your $10 worth of cognitive space/ attention. You have little left over to spend on navigating or conversing or listening to the radio as your working memory limit is at capacity

Three types of cognitive load

Intrinsic load

- This is how much brain space is required to DO the task – when learning something new the intrinsic load is high, but to perform something you have done many times before and mastered means reduced intrinsic load.

To minimise intrinsic load

- Ensure learners first master the fundamental principles of a task before they move on to its more complex processes.
- Sequence skills logically – easy stuff before the hard stuff, high frequency stuff before the low frequency stuff to give lots of opportunity to practice
- Follow the low-to-high fidelity strategy
- Practice, practice, practice

Extraneous cognitive load

- the load generated by the way the material is presented and which does not aid learning
- teachers do have some ability to control
- For example - busy slides in presentations

To minimise extraneous load

- Chunk the material -break up the teaching into bite-sized pieces with clear associations between the various bits of data to help learners comprehend and retain information more effectively.
- **Scaffolding** refers to a variety of instructional techniques used to move students progressively toward stronger understanding and, ultimately, greater independence in the learning process
  - o **Show and tell**
  - o Link new material to what they already know
  - o Time to talk – give learners time to process
  - o Use visual aides
  - o Pause, question, pause, review - check for understanding and give them time to answer
- Pay attention to course design

Germane Load

- the elements that aid information processing and contribute to the development of 'schemas
- a schema is the pattern of thought or behaviour that organises categories of information and the relationships among them., it's the way we file the information into our memory

To decrease the germane load

- use mnemonics
- allow time for reflection
- interleave similar but distinct concepts