Balancing Compensation and Remediation
Learning in a classroom after brain injury

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**Structure of the Brain**

- **Frontal lobe**: Executive functions, thinking, planning, organising and problem solving, emotions and behavioural control, personality.
- **Motor cortex**: Movement.
- **Sensory cortex**: Sensations.
- **Parietal lobe**: Perception, making sense of the world, arithmetic, spelling.
- **Occipital lobe**: Vision.
- **Temporal lobe**: Memory, understanding, language.
* Entire brain talks for one task
  * Front of the brain -
    * regulates ins and outs
  * Senses- connect with learning and memory
  * Emotion - connects with learning and memory

* Structure of the Brain
* Not all Frontal Lobe!
* Procedural Memory - routines
* Coordinates thoughts, especially those related to sequencing
* 0-5 years Pruning!
  * Useful neurons stay
  * Unused are fired

* 6-12 years Maturation!
  * More connections, More support
* Plasticity
* Density
* Use it or lose it
* “In network” or out?
So...How do we use our brains?

To learn and remember!
* Growth of Brain Cells
  * Add dendrites, add chemicals to increase communication, make new pathways, get rid of old pathways
  * Lasts for hours, days, years

* How?
  * Experience
  * Skill training
  * Teaching (direct instruction)

* What is learning?
Consolidation of learning - long term retention

Types
* Rote Memory - Memorization
* Working Memory vs. Long term Memory
* Facts (semantic) - 4 lobes of the brain vs. Events (episodic) - songs/smells enhance deeper consolidation
* Relational

What is Memory?
* Differentiation - More pathways = better!
  * Teach in different ways
  * Teach across subjects/settings
  * Stimulate senses

* Scaffold
  * Trigger old learning
  * Create a ladder of learning
  * Connect to new learning

* Repeat (Basal Ganglia)
  * Use tag lines,
  * transition phrases/songs,
  * Routine,
  * Teach sequentially (then you can fade cuing)
* Surprise
  * Make the brain think - our brains are typically automatic and anticipatory
  * Brain stalls and looks for the reconnection

* Engagement - “Learning promotes learning” (Willis 2006)
  * Arouse a neural pathway and it wants to connect with others!
  * Make students use their brains!
    * Reflective questioning
    * Projects
    * Interactive Lessons

* Meaning - “Make them feel to learn for real!”
  * Activate a deeper pathway to enhance learning connections

**Best Methods**
What happens when the brain gets injured?
* Research is inconsistent regarding outcomes
* Students can thrive if interventions are individual and target specific needs
* Deficits are often in areas such as attention, concentration, memory, executive function, emotional regulation, social, and behavioral functioning
* Must think about students globally - will the interventions translate and generalize

*Research on Brain Injury*
What happens when the brain gets injured?

It has to re-built and re-learn
* Compensation - Going around the problem
* Remediation - Fixing the problem (Learning!)
* Balance while learning in school!
  * Support some skills while teaching others then work up the skill ladder

* Re-learning in Brain Injury
* Patterns - Increases function quickly
  * Use same cue (verbal, visual, experiential)/pattern of behavior
  * Cue will trigger response deeper in the brain freeing up the frontal lobe!

* Breaks - Consolidation time
  * Between subjects
  * Between concepts
  * Limit interference

* Real-time instruction
  * Use teachable moments and reinforce!
  * Enhance meaning, trigger experiential learning

* Learning (remediation) tricks for students with brain injuries
* Scaffold Ladders look different
  * Skills need to be broken down more for more severe injuries

* Brain Tricks
  * Differ depending on severity
    * Less variability in instruction for more severe injuries

* Mild injuries tend to be more purely frontal in nature
  * Compensate and/or remediate executive skills (how to learn) vs. memory skills (pathway creation)
Pre-Requisite skills needed for Writing

* Phonological Processing
* Memory Span (visual memory)
* Motor Skills
  * visuo-motor, graphomotor
* Processing Speed
* Sustaining mental effort (attention)
* Executive functioning
  * planning, organization, monitoring

Creating a Scaffold Ladder
* Compensation options-
  * Read material to student/ use text to speech
  * Reading window/larger print/less on page
  * Pair student with a peer when scanning is needed

* Remediation options-
  * Project based assignments
  * Help the student relate to the subject
  * Provide multiple connections to and from material
  * Teach in the same way you access (in and out the same)

* Needs to learn History, but has trouble with visual scanning
* Compensation options
  * Attention -
    * shorter lessons
    * high interest topics
    * movement breaks
  * Initiating-
    * Provide topic sentence
    * Give closed choice for topic

* Remediation
  * Pre-write with fading
  * MotivAider/ self monitoring system

* Learning how to write, but has trouble with initiating and attending
* Compensation
  * Reduce academic expectation
  * Add aide

* Remediation
  * MotivAider with fading
  * Self monitoring system
  * Highlight or margin notes/write down key words of lecture
  * Use routines - approach assignment/class in the same way, use key phrases (e.g. “d” down “a” away, “talk to 3 then to me”), transition phrases/songs

* Poor attention/focus is impacting ability to learn in the classroom
* **Compensation**
  * Key! - Reduce load on working memory
  * **Checklist** for task completion
  * Pull information **onto paper** and out of the brain!
  * Use formula sheet or problem solving steps

* **Remediation**
  * CogMed
  * Other working memory interventions

* **Poor Working/Short term Memory**, but can learn!
* Need to consider pre-requisite skills when designing a scaffold ladder for brain injury
* Design school based interventions to remediate topic/skill to be learned and compensate for other deficits
* Use a developmental, brain based approach to improve learning and memory!!!


