

Neuroplasticity: Enhancing Learning by Teaching Kids About it

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History

- During most of the 20th century, the general consensus among neuroscientists was that brain structure is relatively immutable after a critical period during early childhood.
- This belief has been challenged by findings revealing that many aspects of the brain remain plastic even into adulthood

Neuroplasticity

The ability of the brain to form new neural pathways or synapses

Brain remodels itself based on experiences

Brain doesn't stop growing after childhood/adolescence, it continues to grow throughout the entire lifespan, whether that's from new synaptic connections or stimulating neural stem cells

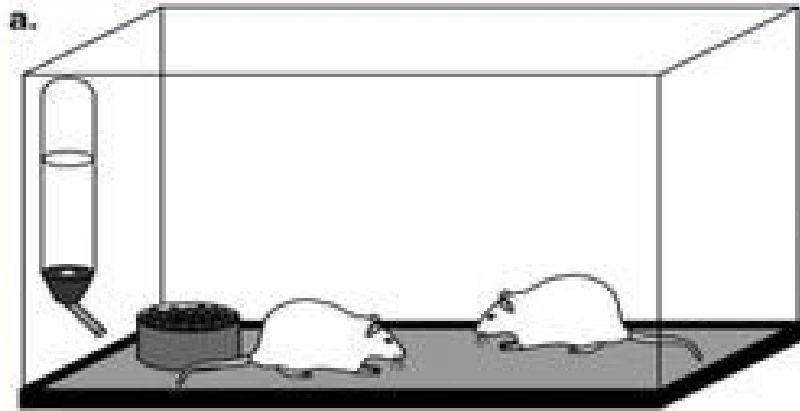
Neuroplasticity occurs in the brain:

1– At the beginning of life: when the immature brain organizes itself

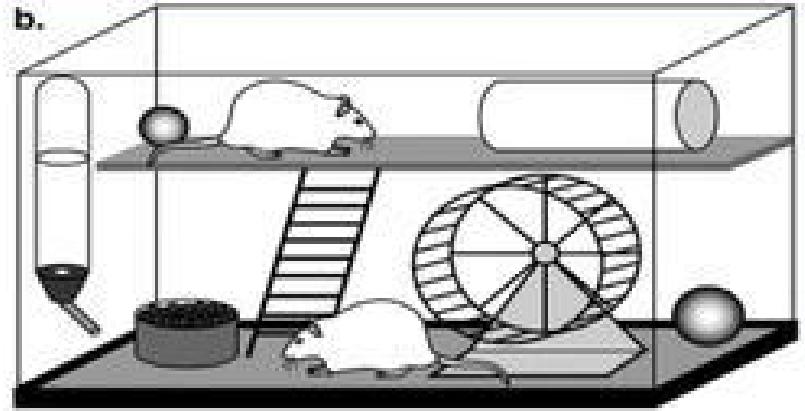
2– In case of brain injury: to compensate for lost functions or maximize remaining functions

3– Through adulthood: whenever something new is learned and memorized

Mark Rosenzweig - rat experiment



standard cage



enriched cage

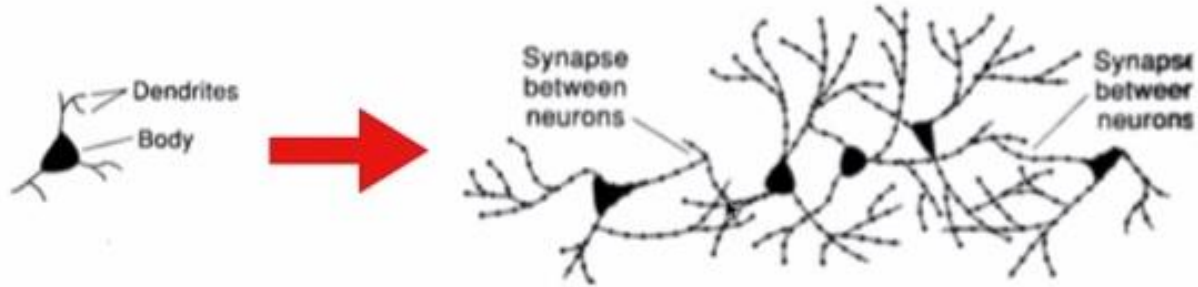


Michael Merzenich

Has made the most ambitious claims for this field:

- That brain exercises may be as useful as drugs to treat diseases as severe as schizophrenia
- That plasticity exists from the cradle to the grave
- That radical improvements in cognitive functioning- how we learn, think, perceive and remember- are possible even in the elderly
- He argues that practicing a new skill, under the right conditions, can change hundreds of millions and possibly billions of the connections between the nerve cells in our brain maps

Neurons After Learning



How to Improve Neuroplasticity

- Sleep
- Exercise
- Nutrition
- Intellectual activity, learning something new
- Brain training
- Eliminate stress
- Social engagement

Case study: Barbara Arrowsmith Young

Multiple learning disabilities, she read and wrote everything backwards, had trouble processing concepts in language, continuously got lost and was physically uncoordinated

After 4 months of her own training , for the first time ever, she could read and understand philosophy books, and tell the time

She has shown that children with learning disabilities can often go beyond compensations and correct their underlying problem

Every single one of us has our own unique profile of cognitive strengths and weaknesses, and if there is a limitation we don't necessarily have to live with it

Use it or Lose it

Younger children often progress more quickly through brain exercises than do adolescents, perhaps because in an immature brain the number of connections among neurons, or synapses, is 50 % greater than in the adult brain.

When we reach adolescence, a massive “pruning back” operation begins in the brain, and synaptic connections and neurons that have not been used extensively suddenly die off- a classic case of “use it or lose it”.

Still, brain-based assessments can be helpful all through school and even in university, when many students who did well in high school fail because their weak brain functions are overloaded by the increased demand. Even apart from these crises, every adult could benefit from a brain-based cognitive assessment, a cognitive fitness test, to help them better understand their own brain.

Learning about Neuroplasticity is Important for:

Educators

Parents

Children

How to Use Neuroplasticity to Help Learn

1- Repetition- repeat over and over so your neurons grow and connect- when it becomes easy it means you have formed the neural connections

2- Practice correct fundamentals- focus on encoding correct technique into your neuros, by taking baby steps and taking your time to build the basics

3- Authentic environment- apply ideas to real systems

Enhancing Student Commitment

- Teaching students about neuroplasticity can have a transformative impact in the classroom. A central facet of our work as teacher educators is teaching about how the brain changes during learning
- Lessons on discoveries that learning changes the structure and function of the brain can engage students, especially when combined with explicit instruction on the use of cognitive and metacognitive strategies that guide them to learn how to learn. The force behind this cycle is students' belief that they can get smarter through study and practice, which enhances their commitment to persist in the hard work that learning sometimes requires. Nisbett (2009) reports on classroom research involving seventh graders who were taught that learning changes the brain and that intelligence is expandable. Students in this experimental group did better on math tests than peers who did not receive that instruction
- The same dynamic of persisting to succeed applies to teaching. Keeping the idea of brain plasticity at the forefront of your professional practice offers a constant reminder that when students struggle with lessons, it isn't because they can't learn, but because they need more practice and instructional support.

Strategies for Engagement

Remind students that they "drive" their own brains- teach them useful learning strategies, make these lessons a BIG deal- "Big Secrets for Thinking and Learning"

Explain importance of practice- For example, here's a great story about neuroscientists investigating how learning affects the brain. Researchers were fascinated with how cab drivers could navigate the busy streets of London so effortlessly and remember all the shortcuts without a map. Brain scans discovered that their hippocampal areas, the part of the brain associated with spatial reasoning, were larger than those of other adults. All those years of driving and remembering routes had literally changed their brains. Studies of musicians have found similar results of the impact of practice, practice and more practice.

Room to Improve- Encourage older students to make the most of their brain plasticity, too. Some high school students seem convinced that their academic shortcomings are innate and permanent.

With the goal of dispelling the misconception that "you're stuck where you are", you could begin the school year by sharing a presentation titled "Your Brain Is Amazing." Reinforce that message throughout the school year by teaching cognitive strategies alongside core content, such as explicit instruction on the organizational skills that students will need to complete a research project, and tricks for puzzling out the meaning of unfamiliar terms.

Take Home Message

- Our brain is dynamic and constantly rewiring itself
- Do not tell kids to learn to live with their limitations, tell them to dare to dream
- We now know about neuroplasticity and we can harness the brain's changeable characteristics to create programs to actually strengthen, stimulate and change our brain
- We need to also challenge current practices that are still operating out of that paradigm of the unchangeable brain
- Our role as educators is to sell them on the idea that they can get better. Talk about this on the first day of class -- how you're not just what you are today, and that hard work really matters

Aim to create a world in which:

- No child has to live with the ongoing struggle and pain of a learning disability
- Cognitive exercises become just a normal part of curriculum.
- School becomes a place that we go to strengthen our brain to become really efficient and effective learners engaged in a learning process where not only as learners can we dare to dream but we can realize our dream