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BRAIN-BASED LEARNING

Brain Development and Adolescent Growth Spurts

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As your students move through adolescence, their brains are going through a dynamic change from chaos to clarity. These developmental changes have profound implications for how you'll be able to guide students during these transformative years.

Brain Remodeling: Chaos to Clarity

The brain first goes through a rapid maturation phase in the months before and after birth, and a second maturation phase throughout later childhood and adolescence. During this second phase of increased brain growth, the **prefrontal cortex** is the site of the brain's most active reorganization and growth. Before building your understanding of what is taking place in the prefrontal cortex during its adolescent growth spurt, let's explore what is housed in this late-developing part of the brain.

The prefrontal cortex is where the highest cognitive and emotional control networks are being constructed, especially during the school years. These networks are what neurologists call **executive functions**.

The networks of the executive functions direct the complex mental processes that you see emerging as students grow. Executive functions can be thought of as the skills that would make a corporate executive successful, abilities that allow them to:

- Organize
- Prioritize
- Communicate effectively
- Accurately interpret validity and value of information
- Make long-range plans to achieve goals
- Assess risk
- Solve problems creatively
- Innovate

These networks do not reach full effectiveness until early adulthood. When well nurtured by use, executive functions ultimately guide the brain's abilities to:

- Manage emotional stability
- Control impulses
- Plan
- Respond productively to corrective feedback
- Learn from mistakes
- Remain resilient to setbacks
- Reflect thoughtfully before making decisions and choices.

Early adolescence (ages 10-12) is a good time to build students' skills of organizing and prioritizing information and time management. The opportunities you provide to guide them in using these executive functions also provide the activation to strengthen these networks when they are at peak neuroplastic responsiveness. As a result of this strengthening, your students will build more skills en route to becoming self-directed learners.

Helping Students Organize Themselves

Successful organization is needed for preparing and completing most activities related to school. The development of this executive function becomes even more critical as the responsibilities and requirements of school and extracurricular activities increase each year. Using strategies that increase student awareness of these skills and providing guided opportunities to use them will help adolescents build the brainpower that they need.

Start by promoting student awareness of their existing organizing skills. Ask questions such as:

- How do you sort your music on playlists?
- How do you organize your files on your computer?

Also, ask questions about familiar things that are already organized systematically, such as:

- How is the content of this book organized into chapters?
- What organization do you see in the periodic table of elements or in dividing plants and animals into classifications such as kingdoms, genus, and species?

Other Strategies

1. Teacher Modeling and Discussion

Model your **systems of organization** (filing, recording progress, how you set up the classroom, etc.). Draw students' attention to the **organizational strategies** that you use during instruction.

2. Clear Instructions

Initially, when providing organizational strategies, emphasize them both verbally and in writing. Give students clear instructions for procedures, projects, or class transitions as you model organizational structure.

3. Student Modeling

Assign selected students to model the procedures that you've described, such as the right way and the wrong way to organize their class groups during collaborative work time.

4. Checking for Understanding

Stop between segments of complex or multi-step instructions, allowing students to organize their thoughts and ask questions. Ask students to repeat back their understanding of the instructions so that they can respond to your feedback and reorganize appropriately.

5. Gradual Release of Responsibility

Throughout the year, plan a gradual decrease in the scaffolding that you provide for student organization of time and goals. For example, back away from giving them your timeline schedule for parts of a book report or project, let them plan and write their own timelines, and revise these as you help them monitor their progress.

6. Feedback

Observe student progress and setbacks and provide feedback with opportunities for them to revise their organizational systems.

The Case for Investing in Executive Functions

As the caretaker of your students' brains during the years of rapid prefrontal cortex development, the opportunities that you provide for them to use these critical neural networks are precious gifts. The tools and skills that you help them build will empower them to achieve their highest potential now, and will increase their satisfaction and success as they inherit the challenges and opportunities of the 21st century.