

# Movement and the Brain

MAXIMIZING MOVEMENT IN THE CLASSROOM AND THE  
EFFECTS ON ACADEMIC ENHANCEMENT



# Intro

- Myself
- Group Intro Game
  - Name, what grade/subject taught, where from
- Music Playing/Whistle = Stop and return to seats



# What Is Physical Activity?

- **Physical activity** is defined as any bodily movement produced by skeletal muscles that requires energy expenditure.
- Anything requiring movement!!!
- **Physical activity** simply means movement of the body that uses energy. Walking, gardening, briskly pushing a baby stroller, climbing the stairs, playing soccer, or dancing the night away are all good examples of being active.
- For health benefits, **physical activity** should be moderate (medium) or vigorous (hard) intensity.

# Benefits Of Physical Activity

- Improves all bodily functions (heart, lungs, brain, etc.)
- Reduces the risk of getting sick and/or diseases (cancer, heart disease, etc.)
- Strengthens bones and muscles, helps maintain weight control
- Stimulates the brain
- Improves Mental Health and Mood and ability to do daily tasks
- Reduces the risk of many diseases/conditions (ex: diabetes, heart disease, cancer)
  - 30% of schoolchildren are overweight (6x more than in 1980) –John Ratey, MD
- Obesity epidemic is a huge concern; but more importantly; mental health.
- Prevents falls by increasing balance and coordination
- Increases life span

1

Northern Gas Company employees who participate in the corporate exercise program take 80 percent fewer sick days.

*-John J. Ratey, Spark*

2

A massive Dutch study of 19,288 twins and their families published in 2006 showed that exercisers are less anxious, less depressed, less neurotic, and also more socially outgoing.

*-John J. Ratey, Spark*

3

A Finnish study of 3,403 people in 1999 showed that those who exercise at least two to three times a week experience significantly less depression, anger, stress, and “cynical distrust” than those who exercise less or not at all.

*-John J. Ratey, Spark*



4

In October of 2000 researchers from Duke University made the New York Times with a study showing that exercise is better than sertraline (Zoloft) at treating depression.

*-John J. Ratey, Spark*

5

Virginia Tech showed that cutting gym class and allocating more time to math, science, and reading did not improve test scores, as so many school administrators assume it will.

*-John J. Ratey, Spark*

6

23 of 25 studies show an increased risk of breast cancer for those women who are inactive.

Physically active people have 50% less chance of developing colon cancer.

Active men over sixty-five have a 70% lower chance of developing the advanced, typically fatal form of prostate cancer.

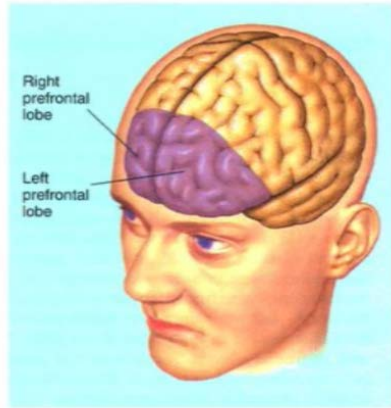
*-John J. Ratey, Spark*

# How Does Physical Activity Affect the Brain?


## The Prefrontal Cortex

### Major Role in Executive Function

- EXERCISE particularly affects our Executive Function
  - Planning
  - Organization
  - Initiate or delay a response
  - Consequence evaluation
  - Learning from mistakes
  - Maintain the focus
  - Working Memory
- Dysfunction in these areas leads to disruption in the organization and control of behavior

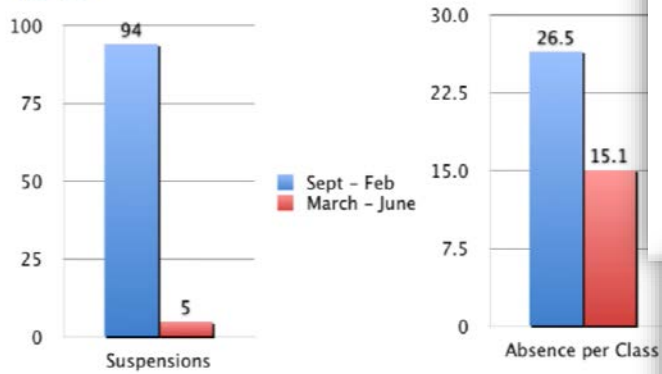


[http://www.driesen.com/prefrontal\\_cortex.htm](http://www.driesen.com/prefrontal_cortex.htm)

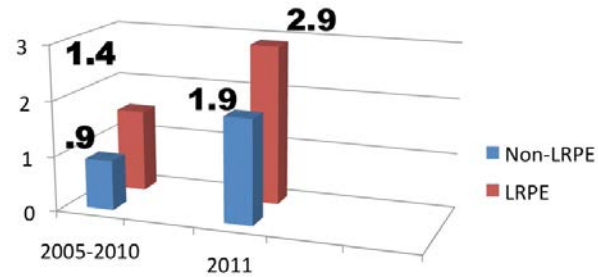
- Increases the amount of oxygen in our blood
- The oxygen is related to enhanced learning and memory (David Sousa)
- Neurotransmitters and endorphins are released and activated
- Our culture treats the mind and body as if they are separate entities. "To keep our brains at peak performance, our bodies need to work hard." (Ratey)
- Many behaviors associated with ADHD are due to lack of movement
- If exercise came in pill form, it would be plastered across the front page of every newspaper, hailed as the blockbuster drug of the century (Patrick Moran).
- TED talks video clip: 



## Behavior

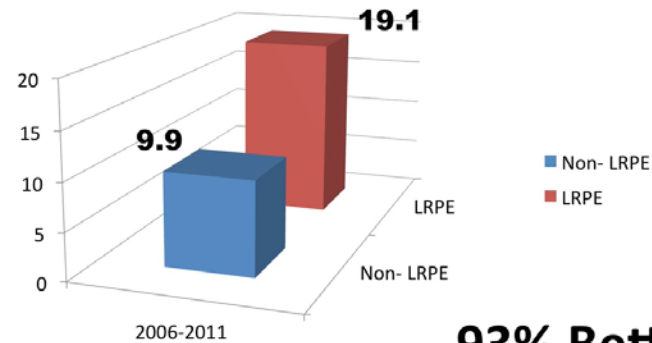


## Academic Reading Data



**52-56% Better**

## Math Data



**93% Better**

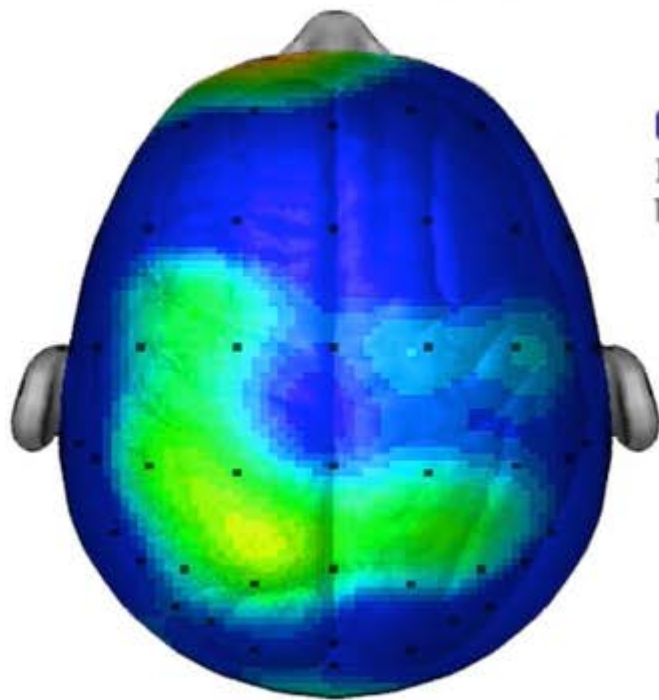
# Case Study

- PAUL ZIENTARSKI - ILLINOIS
- LRPE = Learning Readiness Physical Education – reading intervention program for students with low academic performance. Same lessons were taught; some before PE, some after LRPE and these were the results after 1 semester: After 1 year, 2 years, etc. continued growth

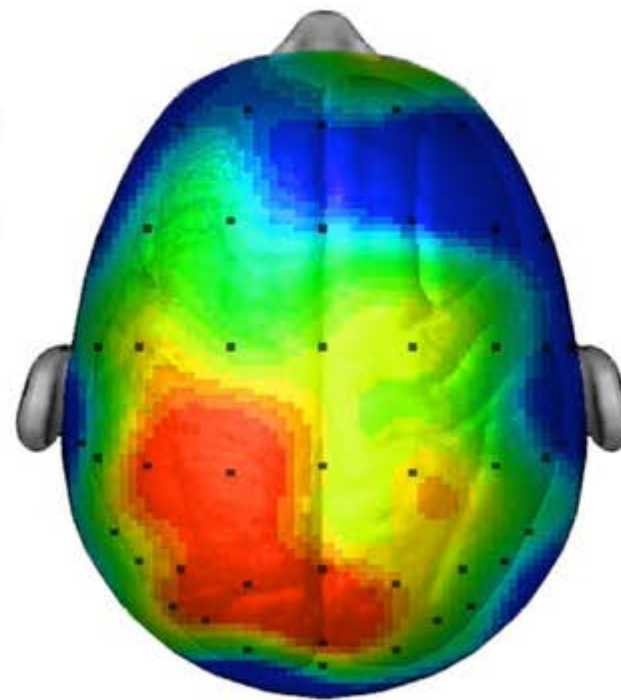
# Average composite of 20 student brains taking the same test

Brains after sitting quietly

Brains after 20 minute walk



Red areas are very active;  
blue areas are least active.



Research/scan compliments of Dr. Chuck Hillman University of Illinois

# active kids learn better

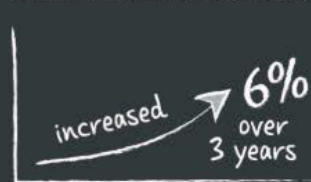


physical activity at school is a win-win for students and teachers

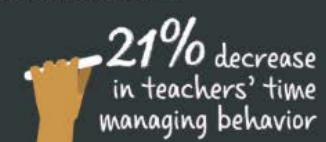
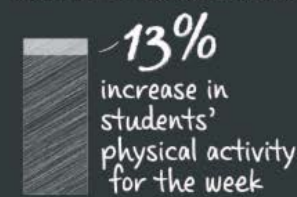
GRADES:



STANDARDIZED TEST SCORES:

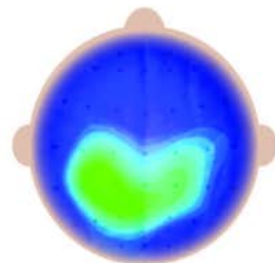


JUST ONE PHYSICALLY ACTIVE LESSON CREATES:

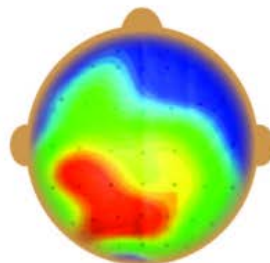


## physically active kids have more active brains

BRAIN SCANS OF STUDENTS TAKING A TEST:



after 20 minutes of sitting quietly



after 20 minutes of walking

Red areas are very active; blue areas are least active.

MORE RESULTS:

after 20 minutes of physical activity:

students tested better in reading, spelling & math and were more likely to read above their grade level

after being in a physically active afterschool program for 9 months:

memory tasks improved 16%

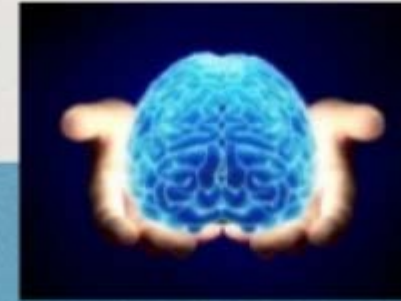


Learn more about why active kids learn better and how schools can help at [activelivingresearch.org/activeeducationbrief](http://activelivingresearch.org/activeeducationbrief).

SOURCES: Donnelly J.E. and Lambourne K. (2011). Classroom-based physical activity, cognition, and academic achievement. *Prev Med.* 52(Suppl 1):S36-S42. Hillman C.H. et al. (2009). The effect of acute treadmill walking on cognitive control and academic achievement in preadolescent children. *Neuroscience.* 159(3):1044-1054. Kamiljo K. et al. (2011). The effects of an afterschool physical activity program on working memory in preadolescent children. *Dev Sci.* 14(5):1046-1058. Klibbe D.L. et al. (2011). Ten years of TAKE 10!: Integrating physical activity with academic concepts in elementary school classrooms. *Prev Med.* 52(Suppl 1):S43-S50. Nelson M.C. and Gordon-Larsen P. (2006). Physical activity and sedentary behavior patterns are associated with selected adolescent health risk behaviors. *Pediatrics.* 117(4): 1281-1290.

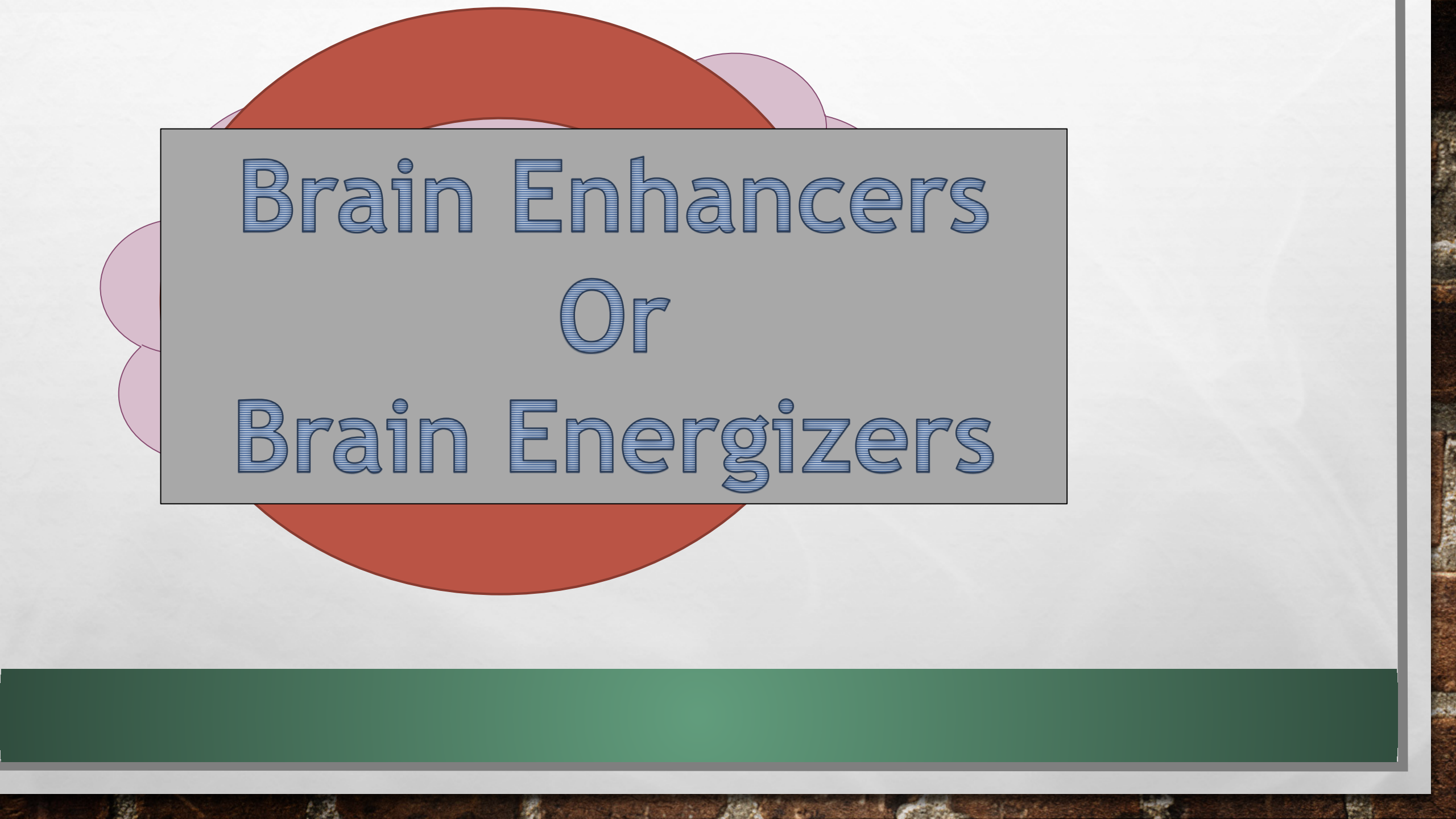
Did you know you can beat stress, lift your mood, fight memory loss, sharpen your intellect, and function better than ever simply by elevating your heart rate and breaking a sweat?

The evidence is incontrovertible: aerobic exercise physically remodels our brains for peak performance.



“I want to cement the idea that exercise has a profound impact on cognitive abilities and mental health. It is simply one of the best treatments we have for most psychiatric problems.”

-Author, John J. Ratey



Brain Enhancers  
Or  
Brain Energizers

# How can I get my students active?

- Anything to get them up and out of their desks! Be creative; let students come up with games too.
- Your Phys Ed teacher is a schoolwide resource for physical activity. Ask them for ideas and more importantly; supplies!!!
  - Activity cards (can be found online)
    - Bocce Ball w/ Bean Bags
      - Large Dice
    - Music, music, music!
      - Go Noodle
  - Body Rock Paper Scissors/"Victory Train"
- Cup Stacking (Youtube videos for tutorials if not taught in PE class)
  - PEGames.org - Classroom PE Games tab



# Middle/High School Level

- Often more difficult to find ways to incorporate movement - only using movement in “special” lessons, but not on a daily basis.

- Tabata timer app

- Students choose an exercise - do 8 rounds (20 sec. Work, 10 sec. Rest) = 4 minutes!
- Start the year doing this the first 4 minutes of every class period and you will notice a difference!

- Gallery walks/chalk talks

- Multiple texts that students need to read and analyze in a lesson
- Post them on the wall; have students rotate around the room in small groups.
  - Ex: students analyzing primary and secondary documents in history classes
  - analyze magazine ads for rhetorical techniques in English class.
- Can also feature student-created texts or be digital {ex: student groups create informational animoto videos on different geographic formations}
- Chalk talk = interactive; students write on large posters or charts - can also use post-its. Ex: math - students write answers and explain their process

- North pole-south pole/continuum

- This strategy is great for formative assessment of learning and background knowledge. Essentially, one side of the room represents one idea, and the other side of the room represents an opposing idea.
- Ex: “My “north pole” was “I feel extremely confident in how well I can comprehend and remember information in the statistics textbook.” My “south pole” was “I feel NO confidence in how well I can comprehend and remember information in the statistics textbook.” Students were asked to align themselves with how they felt. If they felt neither way they would be in the center of the room. Many stood closely, but not completely, to one side, showing the continuum of their confidence. Their responses affected how I presented an array of note-taking strategies, and which students I worked with more closely during the lesson.”



# Middle/High School Level (continued)

- Musical mingle

- Develop a series of questions to ask students before the lesson begins (to assess background knowledge) or after the lesson (to assess learning).
- Ask students to stand; when music plays, they will meander around. When the music stops, they will find a partner to discuss the question with. Once students have had the opportunity to talk, repeat the process.
- Generally, any more than three or four questions results in some diminished focus. Once the activity is done, ask students to share some of their discussion points with the whole class. Most students feel more confident sharing in the whole class because they had an opportunity to clarify and test their thinking with a partner earlier.

- Stations

- Most educators view stations as a staple of the elementary school classroom, but they are also extremely effective in high schools.
- Stations can be utilized for differentiation. For example, based upon students' current writing trends, a teacher could place students at station based upon areas they need to practice. Activities can be on paper, or they can be embedded digitally using QR codes.
- Stations may be rotational, such as short writing prompts, different math problems, different poems to analyze, or different activities for new vocabulary or concepts.

- 4 corners

- Ask the students a question and give them 4 choices for answers – each corner of the room represents an answer
- Students move to the area of their answer
- Students can work together in their “corner groups” and write an argument for their answer
- Can also be done with 3 answers or 2 (true/false) etc.
  - Ex: earth science lesson: students must suggest which alternative energy source is the best investment for our state: solar, wind, or geothermal

# How do I Manage Physical Activity in my Classroom?

- “The Kids Get Crazy!”
- Expectations - set hard limits/rules/boundaries
  - Ex: noise levels (0,1,2,3)
- Stopping Signal
  - Hand clap, “1,2,3 Eyes on Me,” “Give me 5,” Music song that means get back to their desk
  - Practice at the beginning of the year with other procedures. Give them 30 sec. play, practice stopping signal; repeat. If they follow directions; give them more play time and vice-versa.
- Set Boundaries in the classroom
  - Ex: Inside the desks, between these two rows, etc. or the boundaries will be your whole classroom.



A normal child can concentrate for 2-5 minutes per year old they are.

So the time your child should be able to focus on the same task is:

If your child is: They should be able to focus:

2	4-10 minutes
3	6-15 minutes
4	8-20 minutes
5	10-25 minutes
6	12-30 minutes
7	14-35 minutes
8	16-40 minutes
9	18-45 minutes
10	20-50 minutes

Source: Studydog.com

- There is a direct correlation with a child's attention span and their age.
- As children get older, their attention span and ability to learn grows.
- The "chunk" method for teaching lessons:
  - -determine the average age of the students in their classroom and do 2-5 minutes per year old they are (see chart on left). Do something that requires movement between each "chunk" of the lesson.
- In many scenarios, this method has been extremely effective.

**“Exercise is like fertilizer  
for the brain  
... it’s so good, it’s like  
Miracle Gro”.**

John Ratey

# RESOURCES

- BOOK: SPARK BY JOHN RATEY
- [HTTPS://ACTIVELIVINGRESEARCH.ORG/](https://activelivingresearch.org/)
- FAST COMPANY
- [HTTPS://ACTIVITYWORKS.COM/](https://activityworks.com/)

