

The Science

Kinaesthetic cognition

1. Movement facilitates **cognition** (mental processes)
2. For learning many students rely on **kinaesthetic** intelligence (senses stimulated by movement)
3. Students retain information better when movement is used
4. Children who engage in daily physical education show superior, academic performance
5. Mental focus in young children improves significantly after structured physical activity
6. Physical activity helps to increase student achievement
7. Aerobic exercise physically transforms our brains for peak performance
8. Higher achievement is associated with higher levels of fitness
9. Exercise Grows New Brain Cells
10. Children need proper diet and exercise to balance emotions
11. Physical activity and proper diet improves behaviour
12. Exercise reduces stress



<http://gymbus.com>

Brain Chemicals

1. Endorphins:
 - a. self-esteem and the feeling of well-being
 - b. physical activity raises endorphin levels
2. Serotonin: regulates mood, controls impulsive behaviour and staves off stress.
 - a. Elevating the heart rate balances serotonin
3. Cortisol: elevated during stress causing learning to diminish
 - a. Vigorous exercise seems to reduce cortisol levels
4. Dopamine: pleasure response, sharpens attention and increases motivation
 - a. Fun Physical Education increases Dopamine



<http://triskills.com>

Movement has three areas

1. The navigation of one's environment
 - o anchors academic concepts
2. Physical Activity, voluntary movement that expends energy
 - o feeds the brain the needed nutrients of oxygen and glucose
 - o beneficial effects last up to 60 minutes
3. Exercise, physical activity that elevates the heart rate
 - o Kinoshita 1997 - Exercise triggers the release of a brain-derived neurotropic factor (BDNF) that enables one neuron to communicate with another.



<http://abllab.co>

References

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Dr. Howard Gardner
Dr. Marion Diamond, author of Magic Trees of the Mind,
Dr. Candance Pert, author of Molecules of Emotion
Dr. Robert Sylwester, author of A Celebration of Neurons and A Biological Brain in a Cultural Classroom
Susan Kovalik, leading authority on brain compatible learning
Pat Wolfe in her book, Brain Matters: Translating Research into Classroom Practice,