

Advocacy: A Case for Daily Quality PE *Apr28*

Written for TEPE Journal 2001

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What if?

What if one day someone walked into your gym and arrested you, saying that you represented all physical educators nationwide. You are being accused of:

- Not contributing to the learning process of the students
- Not contributing to elevating standardized test scores
- Allowing obesity among children to be at the highest percentage ever and
- Teaching an enrichment subject that is expendable because it is not required as part of the core academic subjects.

Your accusers are anyone who remembers having a bad experience in Physical Education in their youth. Your jury is made up of decision-makers, school board members, legislators and budget makers. The Judge is the nations major decision-maker for the choice of curriculum, facilities, time allotment and class sizes.

- What will be your argument in your defense?
- What will be your evidence?
- Where is your proof that exercise increases learning?
- Who will come to your defense?
- Who will be your witnesses?
- Who will represent you?

Take a moment to ponder the answer to these questions. This scenario is a reality in many districts nationwide. Physical education programs are being eliminated or reduced because of budget reductions or the perceived need for increased time for academic core subjects in order to raise test scores. Recent brain research findings support the importance of daily quality physical education. Educational experts, neuroscientists, and respected brain research authors are advocating for our profession based on scientific evidence that tells us how the brain works, how the brain learns, and how movement, physical activity and exercise prepare the body and brain for optimal learning. Simply put, we must be cautious in making over statements. I recently met and interviewed Swedish neuroscientist, Dr. Germund Hesslow while presenting at the International Learning Conference in Trelleborg, Sweden. Dr. Hesslow and his team at Lund University are internationally renowned cerebellum researchers whose expertise is in the reversal of paralysis caused by spinal injury. When posed the question, Does physical activity increase learning? Dr. Hesslow answered, No. There are too many variables involved in learning: environments, genetics, attitudes, individual learning capacity, curriculum delivery, learning and teaching strengths, etc. When Dr. Hesslow was asked, What role does physical activity play in learning? Dr. Hesslow said that all things being equal, a physically active child will have an ADVANTAGE in learning and that an inactive child is at a DISADVANTAGE for learning. Quality physical education provides needed physical activity in the school day that gives our students an advantage for learning and therefore, may help increase student achievement.

We should also be cautious making claims such as physical education raises test scores. We should focus on physical development. Physical education programs vary from school to school, district to district, state to state. It is easy for decision-makers to cut or reduce physical education programs because of budget issues, but it would be difficult to justify putting childrens health and learning at risk by cutting or reducing daily physical activity that has been proven to put learners at an advantage for learning.

What does the research suggest?

There is specific research, however, that supports daily quality physical education and how increased physical activity can impact student performance and elevate test scores. The following research summaries are found in Eric Jensen's books, *Teaching with the Brain in Mind* and *Learning with the Body in Mind*, both are excellent resources. Adding to the growing body of research extolling the cognitive benefits of physical exercise, a recent study concludes that mental focus and concentration levels in young children improve significantly after engaging in structured physical activity (Caterino and Polak 1999). The findings suggest that such physical exercise as running, jumping, and aerobic game playing have a definite impact on children's frontal lobe primary brain area for mental concentration, planning, and decision-making. Aerobic conditioning seems to assist in memory (Brink 1995). Dustmans research (Michund and Wild 1991) tested three groups of students. The group that engaged in vigorous aerobic exercise improved short-term memory, creativity, and reaction time. The President's Council on Fitness and Sports suggests 30 minutes of physical activity a day to stimulate the brain. In a Canadian study, academic scores went up when physical education time was increased to one-third of the school day. (Vanves and Blanchard).

Students involved in sports generally have higher grades and highest standardized test scores than those who don't participate in sports. In 1990 in Texas, high school athletes scored 17% higher than non-athletes on the ninth-grade Texas Assessment of Academic Skills standardized test.

Researchers James Pollatschek and Frank Hagen (1996) say, Children who engage in daily physical education show superior motor fitness, academic performance and attitude toward school as compared to their counterparts who do not have physical education.

The Evidence: Movement facilitates Cognition

There is specific brain research supporting the need for daily quality physical education that provides us the evidence to validate our programs. There are two aspects of movement that benefit learners: Physical fitness: having a healthy body, healthy mind. Cognitive reinforcement: using a kinesthetic tactile approach to anchor academic concepts.

What does Movement mean?

There are three distinctions or definitions of movement when reviewing brain research that need clarification: Movement, Physical Activity, and Exercise. Movement is the navigation of one's environment, in other words not sitting still or not lying down. Physical activity is voluntary movement that expends energy. Examples of physical activity in the classroom are students role-playing, building models, or playing a toss and catch game to review material. Exercise is physical activity that gets the heart rate into the target heart rate zone.

Movement prepares the brain for optimal learning. Blood traveling to the bodybrain at greater rates feeds the brain the needed nutrients of oxygen and glucose. Glucose is to the brain what gasoline is to a car, brain fuel. Each time you think, you use up a little glucose. Brain activity is measured by glucose utilization. A human exchanges about 10% of his oxygen with each normal breath, meaning that about 90% of the oxygen in our bodybrain is stale until we deep breathe or exercise. A lack of oxygen to the brain results in disorientation, confusion, fatigue, sluggishness, concentration, and memory problems. Vigorous activity in a physical education class gives the brain its needed nutrients.

What happens when we exercise?

When humans exercise, the bodybrain goes into a homeostatic state, balancing brain chemicals, hormones, electricity, and system functions. When the bodybrain is out of balance because of poor nutrition and lack of physical activity, the student is not in a good learning state. Movement, physical activity, and exercise change the learning state into one appropriate for retention and retrieval of memory, the effects lasting as much as 30-60 minutes depending on the student. This evidence is a sound argument for daily quality physical education and/ or recess.

Physical activity provides enriched environments

In early studies in 1991, William Greenough discovered that rats who exercised in enriched environments had a greater number of synaptic connections than sedentary counterparts. Exercise strengthens key areas of the brain like the basal ganglia, cerebellum, and corpus callosum. Dr. Marion Diamond showed that rats in enriched environments had greater density in the cortex and were better problem solvers. Transferred to humans this information suggests that physical activity in a positive social setting like physical education class creates an active safe environment for learning.

Being active grows new brain cells

Van Praag and associates (1999) conducted animal studies that suggest running and other aerobic activity promote brain cell regeneration and growth. Aerobic activity releases endorphins, the class of neurotransmitters that relax us into a state of cortical alertness and reduce the symptoms of depression. Exercise also tends to raise levels of glucose, serotonin, epinephrine, and dopamine, chemicals that at elevated levels are known to inhibit hunger and balance behavior.

The caution here is that it is not known what role neurogenesis plays in learning and memory. Dr. Fred Gage from the Salk Institute in La Jolla, California found that new brain cells are generated in the hippocampus, the brain's learning and memory center. He is uncertain whether the neuronal growth is the result of the cardiovascular benefits of running or the fact that running is a natural rat activity. When I asked Gage's colleague, Dr. Philip Horner to clarify, he stated that it is certain that running grows new brain cells in rats and that most animal studies translate into human findings. It is not certain if humans grow new brain cells in other ways. Until then, Horner says, he'll keep running just to be safe. However, more research is needed in this under-explored area, a challenge for our university researchers in kinesiology.

Aerobic fitness aids cognition

Researchers found that subjects who were the most aerobically fit had the fastest cognitive responses, measured by reaction time, the speed that subjects processed information, memory span, and problem solving. Additional studies are needed to determine the precise relationship between aerobic fitness, age, and cognition. Earlier research supported by a new study suggests that aerobic exercise-nonstop and lasting a minimum of 12 minutes may serve to slow or minimize normal age related declines in cognitive functioning. Aerobic activity not only increases blood flow to the brain, but also speeds recall and reasoning skills. (Etnier, et al. 1999) (Van Boxtel, et al. 1996)

Exercise triggers BDNF

Exercise triggers the release of BDNF a brain-derived neurotrophic factor that enables one neuron to communicate with another. (Kinoshita 1997) Students who sit for longer than twenty minutes experience a decrease in the flow of BDNF. Recess and physical education is one way students can trigger sharper learning skills.

Cross lateral movement organizes brain functions

Crossing the midline integrates brain hemispheres to enable the brain to organize itself. When students perform cross lateral activities, blood flow is increased in all parts of the brain making it more alert and energized for stronger, more cohesive learning. Movements that cross the midline unify the cognitive and motor regions of the brain: the cerebellum, basal ganglia, and corpus callosum while stimulating the production of neurotrophins that increase the number of synaptic connections. (Dennison, Hannaford) Most all of the activities we do in physical education cross the midline and require coordination of body systems for mastery at any level. Daily quality physical education then becomes essential for optimum learning.

Eye tracking exercises and peripheral vision development helps reading One of the reasons students have trouble with reading is because of the lack of eye fitness. When students watch screens their eyes lock in constant distant vision and the muscles that control eye movement atrophy. Physical education curriculum provides this avenue for strengthening eye muscles. Tracking exercises,

manipulatives, navigation activities and target games exercise the eye muscles making the eyes fit to read.

Balance improves reading capacity

The vestibular and cerebellum systems (inner ear and motor activity) are the first systems to mature. These two systems work closely with the RAS system (reticular activation system) that is located at the top of the brain stem and is critical to our attentional system. These systems interact to keep our balance, turn thinking into action, and coordinate moves. Physical Education curriculum games and activities that stimulate inner ear motion like rolling, jumping and spinning are necessary to lay the foundation for learning.

Exercise reduces stress

Exercise engages the emotions. Emotion drives attention which drives learning (Sylwester). Inside the brain, the amygdala (the brain's emotional filter) touches the basal ganglia that interprets movement. Therefore, motion and emotion are connected physiologically. Movement can foster self-discipline, improve self-esteem, increase creativity, and enhance emotional expression through social games (Jensen, 2001).

Research suggests that mental stress and anxiety can rob the brain and body of adequate oxygen by interrupting normal breathing patterns (Bernardi et al. 2000, Sloan et al. 1991). However, studies also indicate that proper breathing exercises can enhance oxygen flow, thereby reducing heart rate and anxiety (Bernardi ET al. 2000, van Dixhoorn 1998). New evidence shows that regular exercise is just as effective as drugs in relieving the symptoms of major depression (John Fauber, 2000). Dr. John Ratey from Harvard University found that regular exercise has the same effect as anti-depressant drugs because of its positive effect on mood altering neurotransmitters in the body/brain. Cancer patients experienced a 40% drop in depression while on a regular exercise program. Students who exercise in active physical education classes can reduce stress and anxiety naturally.

Physical activity and proper diet improves behavior

There may be link between early motor development and violent behavior. Infants deprived of stimulation from touch and physical activities may not develop the movement/pleasure link in the brain. Fewer connections are made from the cerebellum to the brain's pleasure/pain centers. An inactive child may grow up unable to experience pleasure in a normal way and an intense state of behavior such as violence may develop. (Kotulak, 1996). That's the bad news. The good news is that when this child becomes physically active, the pleasure and pain centers develop equally. Tag games, flag football, and sport related activities under proper adult supervision become practice for the positive rough and tumble play that is needed for balanced development of the pleasure/play centers of our brain. This describes a quality physical education program, as well as quality athletic programs.

Movement can help reinforce academic skills for all students.

Eighty five percent of school age children are natural kinesthetic learners (Hannaford). Sensory motor learning is innate in humans. Teachers who incorporate kinesthetic teaching strategies reach a greater percentage of the learners. Eric Jensen says that implicit learning (learning through your body) is more powerful than explicit learning (text, facts, and basic recall). If it's not in your body, you haven't really learned it. He suggests movement, physical activity and rhythms as a way teachers can help students bind learning through perceptual motor skills, procedural encoding, and sensory integration. It should be just as natural for a math teacher to use movement in the classroom as for a physical educator to have students skip count.

Recess/Play can increase attention

Dr. Daniel Kripke of California explains that the human brain was designed to set the timing of circadian rhythms from extensive exposure to daylight. When there is too little outdoor daylight exposure or inadequate indoor lighting, circadian rhythms times are off, like a clock that runs too slow. This condition is called delayed sleep phase syndrome. When this happens, a child or adult

has trouble falling asleep at normal bedtime and trouble waking up when the alarm goes off in the morning. More importantly, attention may be inadequate for several hours after awakening. Recess is being sacrificed for more academic time in the classroom, limiting needed bright daylight exposure that effects the childrens optimum learning because of lack of rest. Physical education class that is limited to once or twice a week reduces time for natural daylight and needed instruction on health and fitness habits for lifetime learning. The result is students who are lacking attention for learning because of deprived rest from delayed sleep phase. Free play at recess augments social and cognitive development that ultimately translates into classroom performance. Children who learn to operate among their peers participate in such interactive games as tag and chase and function in their own mini-societies on the playground will do better academically. (Mike Daniel, Dallas Morning News, 11/24/2000)

Who will be your witnesses?

Many brain research experts are advocating for daily physical education in educational circles citing strong evidence that supports the link of movement to learning. Heres what some of the leading experts in brain compatible learning say:

Dr. Howard Gardner, author of *Frames of Mind*, declared one of his eight multiple intelligence as the bodily kinesthetic multiple intelligence. If physical education is cut from our schools, one eighth of human intelligence is eliminated. Physical education is one of the few disciplines that incorporate most of the eight identified intelligences simultaneously in our lessons.

Dr. Marion Diamond, author of *Magic Trees of the Mind*, whose research on enriched environments supports the importance of play in early brain development. This critical motor development sets the stage for brain processes used later for decoding and problem solving, a strong argument for daily elementary physical education starting in kindergarten.

Dr. Candance Pert, author of *Molecules of Emotion*, lauds the importance of proper diet and exercise to balance emotions naturally. Learning happens throughout the body not just in the synaptic connections of the brain. Healthy active students make better learners.

Dr. Robert Sylwester, author of *A Celebration of Neurons* and *A Biological Brain in a Cultural Classroom*, states that movement facilitates cognition. He says that the reason humans have the brain we do is to move. He also points out that a central mission of the brain to intelligently navigate its environment. Therefore, learning must include movement concepts and skills.

Susan Kovalik, leading authority on brain compatible learning whose ITI model serves 250,000 students, includes movement to enhance learning as one of the brain compatible components based on brain biology findings. She believes that students retain information better when movement with intention is used to teach academic concepts kinesthetically. Eric Jensen at the *Fragile Brain Conference* outlined the causes and brain changes in several learning differences. He concludes that movement, rhythms, physical activity, and exercise help control many of the conditions such as ADD, Dyslexia, Learned Helplessness, Hyperactivity, Delayed Sleep Disorder, Oppositional Disorder, Learning Delays, Reactive Attachment Disorder, Brain Injury and Insults, and Conduct Disorder. Physical education curriculum provides not only activity and exercise, but also builds relationships, provides team membership and celebrations, promotes rhythm and cross lateral movement, and encourages manipulatives for control. Many students with learning disabilities find success in the gymnasium because our curriculum meets their needs in a way that the traditional classroom may not.

Who is the best lawyer to defend you? You!

As the emphasis in education turns toward assessment, it is important that physical educators keep current with the latest brain research that validates our profession. Promote your program. Read articles and publications. Join your state and district AHPERD and attend professional conferences and conventions. Advocate for your program through community events like Jump Rope for Heart

and Hoops for Heart and invite the media. Spread the word to your school staff, parents, school board members and legislatures. Be educated in state and national standards for testing. Design lessons that teach the academics kinesthetically to reinforce cognition. Your best advocate is YOU and the students you teach. They are your best witnesses!

The verdict: You are Central to the learning process

This is an exciting time to be a physical educator. Physical Education is central to the learning process of each and every child. Brain research is validating our profession. Because we know more about how the brain learns, we can better teach our students. You are the answer. You are not just a PE teacher. You are the most brain compatible professional on the campus. Be proud. Be informed. We teach children, not content and the health and learning of our students is our number one priority.

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