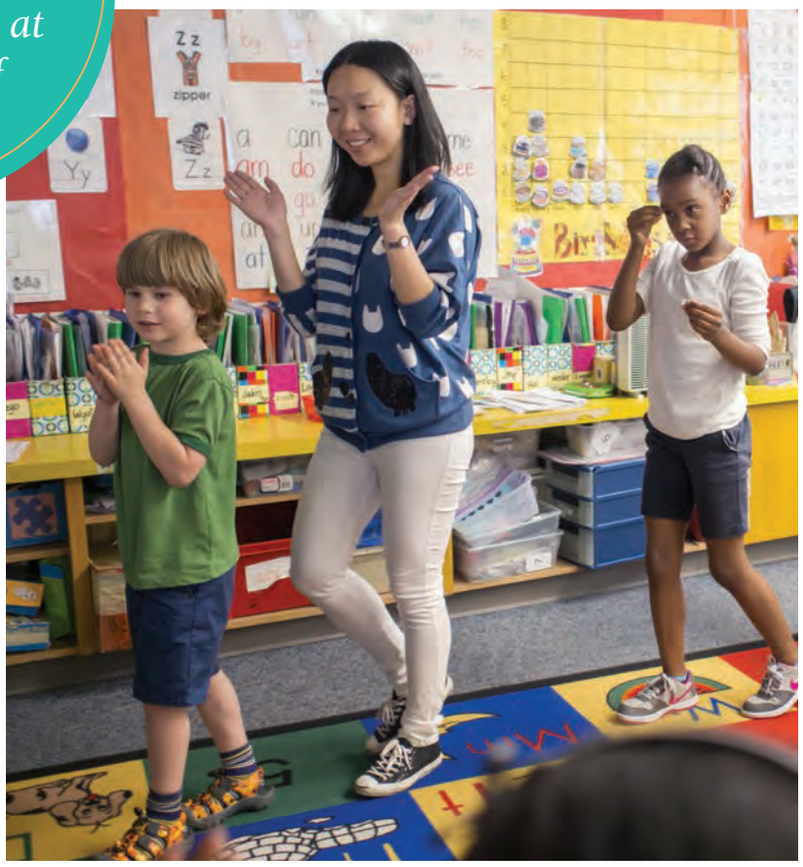
"Don't Just Sit There... Pay

Research in cognitive science makes it clear: Movement is at the crux of learning.

Wendy L. Ostroff



I recently had dinner with a former student who is beginning her career as a kindergarten teacher. According to her mentor teachers, the top priority for kindergarten today is training children to sit still. Our conversation got me thinking about the goals of kindergarten in past decades. When kindergarten was conceived in 1850s Germany, children literally spent their time in the garden, playing together. In the 1940s, after completing her training to teach kindergarten, my great aunt was required to sing and play piano, because the bulk of her days would be spent in song.

Educators knew then what cognitive scientists have seen in the lab: Active play and movement are at the crux of children's learning. So how has kindergarten become about learning to sit quietly? And will better sitters become more focused learners?

Movement—A Prerequisite for Attention

The answer to the latter question is *no*. Yes, children's ability to learn depends on whether they can allocate and sustain focused attention. And the ability to stay on task is one of the strongest predictors of success throughout school (DiPerna, Lei, & Reid, 2007). But sitting still is not the way that deep attention and learning emerge. Cutting-edge research in developmental science and cognitive neuroscience is proving the exact opposite.

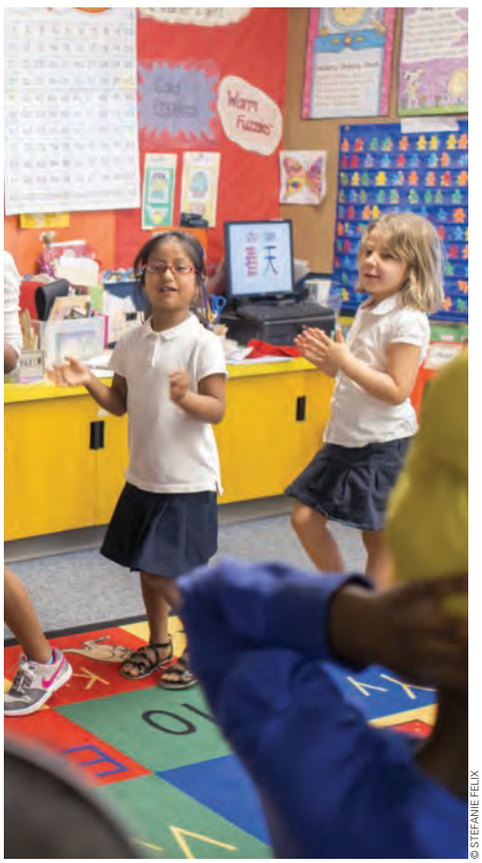
Attention is first and foremost an active process. Humans evolved our complex brains within a dynamic surround. For 99 percent of the time humans have lived on earth, we've spent our days outside hunting for food, avoiding predators, and moving from place to place. We needed to pay attention to survive. Consequently, our brains have been set up to operate best in changing environments (Gray, 2013; Medina, 2012).

Even today, young children devote most of their waking hours to movement. Running, jumping, wrestling, and playing are what it means to be a kid. Children's bodies, metabolisms, and bone structure are designed to be active all day (Imus, 2008). Rather than trying to get children to stop fidgeting, we should embrace their tendency to move as a prerequisite for developing focus. Let's look at how movement enhances attention.

Brain Breaks

The attention systems in our brains work in bouts, with the average learner needing a shift in focus every 10 minutes.

Attention!”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This isn’t due to laziness or lack of motivation; it’s because the human brain constantly scans the environment and orients to things that might be important to seek out or avoid. When teachers build movement into classroom lessons, they provide natural breaks in focus for children, enabling them to harness their attentional resources for short spurts and then seamlessly transition to their next item of interest.

Ideally, make information seem newly relevant every 10 minutes within a lesson, especially if learners are passively sitting and listening. As you approach the 10-minute point, mix it up a bit by telling a joke, playing a song, or even asking for a show of hands. Better still, incorporate movement into the lesson. Have kids clap a rhythm to accentuate word syllables; pair them up to pantomime a story with each other; or do math problems at the board as relay races, with each student doing one operation of a multistep problem.

Taking frequent breaks when studying helps us learn efficiently. Psychologist Hermann Ebbinghaus discovered in the 1880s that attention functions best when it’s broken down into manageable episodes. He invented lists of hundreds of meaningless syllables (*dax, bip*) and tested his ability to remember them under various conditions. Even when he devoted the same total amount of attention to the task, Ebbinghaus performed significantly better when he scheduled in breaks.[1] Hundreds of similar studies have been published. Any cognitive scientist will tell you that the best predictor of learning isn’t the amount of time spent on a task but how well learners distribute their focus in doing that task.

So create lessons that revisit themes over time. This gives learners an opportunity to approach the information in new contexts and think about it in multiple ways. Teach students to practice material in various settings, preferably with movement involved—such as reviewing multiplication tables while lining up for lunch. Remind students as they prepare for a test that their memory systems will perform better if they study over several sessions with breaks in between.

What kinds of breaks propel attention best? Movement breaks! A student’s mind is like an Etch-A-Sketch; it needs to be shaken now and then, to reset the screen and maximize performance. Third grade teacher Marjan Sobhani takes her class outside to run a lap around the school when she sees their eyes glaze over. Megan Linares asks her students to do jumping jacks or stretch in place. These teachers know that the few minutes lost to such actions are easily regained by the quality of students’ engagement afterward.

Self-Regulation

In the course of a day, we all go through many different states of arousal. Sometimes we are “up,” with hearts pounding; other times we’re calm and our breathing is steady. When we’re excited or upset, it’s very difficult to concentrate. Adults have mostly learned how to regulate their arousal states—to bring the nervous system back down when it’s too revved up and gear up when energy is low. We may walk around a bit, splash water in our faces, or get a drink. Children need to learn such strategies. Telling them to sit still generally won’t help them change their state.

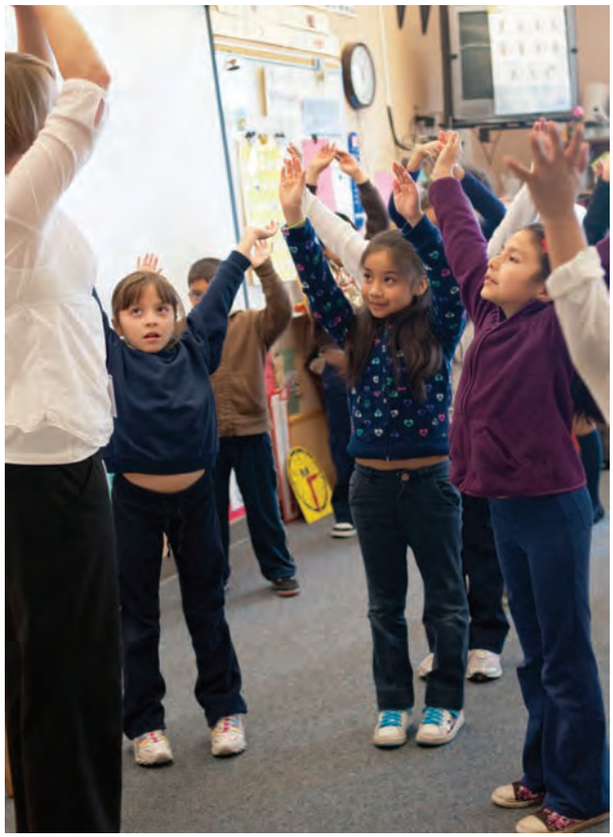
Self-regulation is a precursor to attention and uses the same brain systems (Rueda, Posner, & Rothbart, 2004). Students who self-regulate well tend to focus their attention easily and, as a result, succeed at school. Because children develop foundational skills for self-regulation in the first five years of life (Galinsky, 2010), early childhood teachers play an important role in helping kids learn to regulate thinking and behavior.

If teachers want to enhance self-regulation and attention in the classroom, the best thing they can do is join students as they explore the materials and lessons—sort of "playing student"—to model the types of behaviors they'd like to see. Help students notice learning materials, and provide opportunities to use them appropriately. Gently invite students to work together or help them transition smoothly into the next activity. A teacher might count down from 10, letting students know that when she reaches 1, it'll be time to move on to the next station; or he could model finishing one task and preparing to move on.

Give children a context and language for self-regulation, and model how to talk about it ("I feel stressed" or "I have lots of energy right now"). Ask a student who seems tired, "Do you need a break?" Or, if a student is clearly tense, ask, "How can you change your state?"

Preschool director Kiera Durett uses blowing and sucking exercises with straws that teach children deep breathing techniques. She shows kids how to do "belly breathing" by putting a beanbag on their bellies and watching it rise and fall. Her students do this when they need to refocus on their bodies. Other self-regulation strategies include counting backward and progressive muscle relaxation. If you teach children such techniques, they'll begin to manage their own states of arousal. You might let students know that it's physically impossible to remain stressed after taking 10 deep breaths.

Recess is of utmost importance here. For children to take care of their emotional and physical states and subsequently refocus, they must have enough time to take breaks and move freely—and that means recess.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In the 1950s, having three recess periods per day was common, with children expected to sit still in the classroom for roughly the same amount of time they would run free and play (Pellegrini & Bjorklund, 1997). Today, many schools are eliminating recess. This is a disaster for learning and for attention in particular. Research clearly shows that the longer the stretch of time children are confined to the classroom, the less attentive they become (Pellegrini, Huberty, & Jones, 1995). After children play outside, their attention drastically improves.

It may be no accident that the rise in Attention Deficit and Hyperactivity Disorder (ADHD) has corresponded directly to the decline in recess time (Panksepp, 2008). Indeed, typical accommodations for this attentional problem include opportunities to release pent-up energy. In one study, students diagnosed with ADHD showed significantly more inappropriate behavior on days without recess—and greater academic achievement on days with more time on the playground (Ridgway, Northup, Pellegrin, LaRue, & Hightshoe, 2003). We must make sure administrators and school boards know how essential recess is.

Aerobics and Brain Function

Just like it improves muscles, physical movement promotes brain adaptation and growth and allows the brain to respond to future challenges (Mattson, 2004). Specifically, aerobic activities increase the ability of the heart to deliver oxygen to the brain, which affects cerebral structure, cerebral blood flow, growth of new neurons, production of neurotransmitters, and production of proteins responsible for the survival of developing neurons. All these enhancements are directly associated with improved attention (Etnier, Nowell, Landers, & Sibley, 2006).

Students who participate in regular aerobic exercise do better on a myriad of cognitive measures. Children who spend their days running and playing also show increased stimulation of the frontal lobes, less impulsiveness, and

increased ability to focus (Panksepp, 2008). In one study involving 8,000 students, academic ratings and grades were significantly correlated with exercise levels and with performance on physical fitness tests (Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001).

To enhance the function of the attention centers of the brain for students in your school, support relevant, exciting physical education programs. Phil Lawler, director of physical education at Madison Junior High School in Illinois, sparked a revolution in his school's approach to physical education by introducing a program called PE4life that encourages each student to progress toward his or her personal fitness goals. The students engage in physically strenuous play—both traditional activities like climbing rock walls and newer ones like Dance Dance Revolution—and ride interactive, gaming stationary bikes. They wear heart monitors while doing these activities to assess whether they're working in their optimal aerobic zones (Viadero, 2008).

Human brains have been set up to **operate best in changing environments.**

"Doing the Information"

Movement gives a student's brain a chance to "do" information that the student is learning, rather than to only see or hear it. It gives the mind information through more senses. Reaching, jumping, and balancing teach children how to understand and negotiate the world in a multimodal fashion.

The more the whole body is involved in any learning experience, the more engrossed and focused the learner will be. Physical movement couples nicely with other dimensions of sensation—visual, auditory, or tactile—and being physical keeps students interested because they have to be engaged to keep up, literally, with their marching or dancing neighbors. The diverse brain regions activated when someone performs a movement while learning a concept will become linked together via neuronal networks. The more complex those networks are, the easier it will be to remember that concept later.

You can stimulate attention through movement in virtually any classroom lesson. Have students race around on scooters to match words with their definitions, which are printed on cards around the gym (Viadero, 2008). Let students show the answers to arithmetic problems by jumping the correct number of times.

Kinesthetic experiences expand children's creativity and understanding of their own bodies. As choreographer and science educator Susan Griss (1994) points out, toddlers rolled down hills, flailed their arms, and jumped for joy long before they began to express themselves with language. In a science lesson on sound waves, Griss has students guess the medium through which sound moves the fastest—air, water, or a solid. She lines students up in "molecule formations" (with the kids closest together representing molecules of a solid and those farthest apart representing air molecules) and passes a "sound wave" (shoulder tap) through the line. When the group representing a solid finishes passing the tap down first, all the kids suddenly understand.

Cognitive scientists at the University of Chicago discovered that movement can help students master complex math skills. In a series of studies, they asked one group of 2nd graders to gesture when they explained their solutions to difficult math problems, and asked a second group to just verbally explain the solutions. Children who were unable to solve the problems but were in the gesturing group tended to add new—and correct—problem-solving strategies to their repertoires. When children from the gesturing group attempted to solve difficult math problems later, they were significantly more likely to succeed than those in the nongesturing group. This is probably because they had taken in and then explained their own process in a dynamic, active, multimodal manner. They were engaging more than one part of their brain at a time, making more complex neural networks (Broaders, Wagner Cook, Mitchell, & Goldin-Meadow, 2007).

Making the Shift

As educators, we need to shift our thinking on attention from a passive to an active model. Findings from the laboratory—as well as evidence from our own classrooms—make it clear: Movement is the best medium for harnessing and directing students' focus. Attention (in kindergarten and beyond) is infinitely more complex than merely sitting still and being quiet. It's about being present and aware, about jumping up and saying "yes" to learning. EL

[1]When Ebbinghaus studied a 12-syllable list 68 times in one day, he could remember it perfectly. But if he distributed his studying over three days, he only needed to study it 38 times to recall it perfectly (Willingham, 2002).

References

Broaders, S. C., Wagner Cook, S., Mitchell, Z., & Goldin-Meadow, S. (2007). Making children gesture brings out implicit knowledge and leads to learning. *Journal of Experimental Psychology: General, 136*(4), 539–550.

DiPerna, J. C., Lei, P.-W., & Reid, E. E. (2007). Kindergarten predictors of mathematical growth in the primary grades: An investigation using the Early

Childhood Longitudinal Study—kindergarten cohort. *Journal of Educational Psychology*, *99*(2), 369–379.
Dwyer, T., Sallis, J. F., Blizzard, L., Lazarus, R., & Dean, K. (2001). Relationship of academic performance to physical activity and fitness in children. *Pediatric Exercise Science*, *13*, 225–237.
Etnier, J. L., Nowell, P. M., Landers, D. M., & Sibley, B. A. (2006). A meta-regression to examine the relationship between aerobic fitness and cognitive performance. *Brain Research Reviews, 52*, 119–130.
Galinsky, E. (2010). *Mind in the making: The seven essential life skills every child needs* (NAEYC special ed.). New York: HarperCollins.
Gray, P. (2013). *Free to learn: Why unleashing the instinct to play will make our children happier, more self-reliant, and better students for life*. New York: Basic Books.
Griss, S. (1994). Creative movement: A physical language for learning. *Educational Leadership, 51*(5), 78–80.
Imus, D. (2008). *Growing up green: Baby and child care*. New York: Simon and Schuster.
Mattson, M. P. (2004). Pathways towards and away from Alzheimer's disease. *Nature, 430*, 631–639.
Medina, J. (2012, November). *Educating diverse minds: Using individual brain differences to teach and reach all learners*. Keynote speech delivered at the 33rd Learning and the Brain Conference, Boston, MA.
Panksepp, J. (2008). Play, ADHD, and the construction of the social brain: Should the first class each day be recess? *American Journal of Play, 1*, 55–79.
Pellegrini, A. D., & Bjorklund, D. F. (1997). The role of recess in children's cognitive performance. *Educational Psychologist, 32*, 35–40.
Pellegrini, A. D., Huberty, P. D., & Jones, I. (1995). The effects of play deprivation on children's recess and classroom behaviors. *American Educational Research Journal*, *32*, 845–864.
Ridgway, A., Northup, J., Pellegrin, A. LaRue, R. H., & Hightshoe, A. (2003). The effects of recess on the classroom behavior of children with ADHD. *School Psychology Quarterly, 18*(3), 253–268.
Rueda, M. R., Posner, M. I., & Rothbart, M. K. (2004). Attentional control and self-regulation. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self regulation: Research, theory, and applications* (pp. 283–300). New York: Guilford Press.
Viadero, D. (2008). Exercise seen as priming the pump for students' academic success. *Education Week, 27*, 14–15.
Willingham, D. T. (2002). How we learn: Ask the cognitive scientist. Allocating student study time: "Massed" versus "distributed" practice. *American Educator, 26*(2), 37–39.

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