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THE EDUCATION OF **CHARACTER**

Scientists, politicians and celebrities are **remaking schools** as gyms for the brain where teachers build the mental brawn for attention, perseverance and emotional control

By Ingrid Wickelgren

PHOTOGRAPHY BY CHRISTOPHER MORRIS

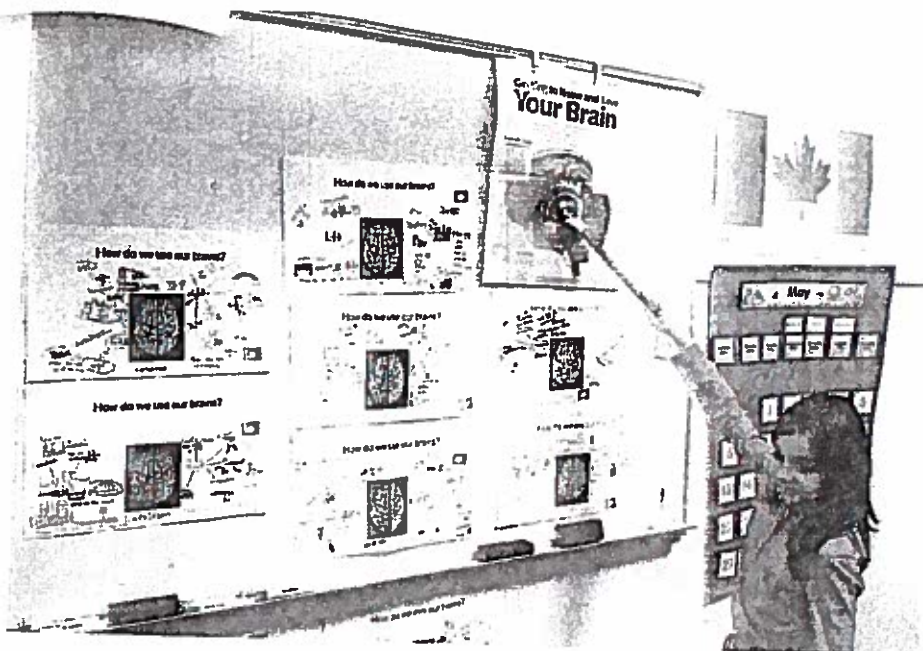
A tiny dark-haired girl bedecked in a brown dress with a crinoline skirt sits calmly on the rug in front of her class of fellow kindergartners; her pink boots, dotted with sparkles, are tucked neatly under her legs. Wielding a small metal rod, she taps on a triangular chime. At the tone, her classmates clasp their hands together like a cup, with the back of one hand in the palm of the other, close their eyes, fall silent, and proceed to say and do apparently nothing.

Minutes pass. Then the fancily frocked girl strikes the triangle a second time. Kids begin to open their eyes, and after a pause a sweet, high-pitched "thank you" emerges from the girl, and she reassumes her place among her classmates.

In this exercise performed three times every day in Patricia Morris's class at Renfrew Elementary School in Vancouver, B.C., the children focus on their breathing, an activity that hardly seems pedagogical. Proponents say, however, these meditative bouts hone the ability to concentrate and to relax, tuning a child's brain for learning and for life. They are one piece of a program called MindUP conceived by actor Goldie Hawn, who debuted it in this city several years ago. Today the Vancouver school board sanctions it, and fueled by success stories, it is spreading through the U.S. and trickling into other countries.

Hawn's program, which also includes brain anatomy lessons and strategies spun from positive psychology such as training in optimism, is one of several curricula aimed at

Social and emotional learning is designed to sculpt fundamental abilities such as paying attention and exercising self-control. In one program, children learn to focus on, and control, their breathing.



A student points to a region of the brain at Sir William Van Home Elementary School in Vancouver. She and her classmates invoke brain anatomy daily in lessons that teach more than just science. The exercise of thinking about thinking—or metacognition—is designed to help children better regulate their own thoughts and actions.

ing memory), to switch mental gears and to inhibit inappropriate responses.

Facility with some of these mental knobs is closely tied to intelligence [see “Building Better Brains,” on page 59]. Yet others constitute a gold mine of brilliance that has proved to be more important to success and well-being than have measures of IQ. In particular, inhibitory control, also called self-

redesigning education. A burgeoning number of researchers and educators believe that school should include more than remembering and analyzing information. It also should sharpen fundamental psychological skills called executive functions that are needed to plan and carry out goals. Akin to an air traffic-control system that manages the comings and goings of planes on multiple runways, these brain functions include the ability to hold and manipulate information in mind (work-

regulation in some contexts, underlies the ability to pay attention and to act in a way that furthers your goals even when you really want to do something else. Learning issues afflict large numbers of children who have trouble focusing, say, or following through in the face of frustration. “Even more important than your achievement test score is this idea that if you fail, you’ll try again, that you don’t need people to bail you out, that you’ll persevere in the face of difficulty,” says developmental psychologist Dale Farran of Vanderbilt University. “These are the key to the grades you get in school.”

Beyond grades, the ability to handle emotions and behave appropriately helps us deal with life. Emotional control buffers kids against mental health problems such as anxiety and depression. It also helps them maintain good relationships with others. “Self-regulation is a critical skill that needs explicit, intentional focus in the school curriculum,” says developmental psychologist Kimberly A. Schonert-Reichl of the University of British Columbia. “It has such long-range implications for kids’ functioning.”

Attempts to teach executive function, typically couched as social and emotional learning, have gained political support in recent years. The Collaborative for Academic, Social, and Emotional Learning (CASEL), a non-



When a child is down, she can grasp a “gratitude stone,” a soothing reminder to be grateful.

FAST FACTS

Schooling Self-Control

- 1 Some researchers and educators believe that school should hone psychological skills called executive functions that are needed to plan and carry out goal-directed activity.
- 2 Learning issues afflict large numbers of children not because they are unintelligent but because they have trouble focusing or following through in the face of frustration.
- 3 A dispassionate focus on the present—mindfulness—helps to ward off stress and can improve brain function.
- 4 Thinking about thinking, known as metacognition, may give kids better control over how they think and feel in ways that could enhance learning.

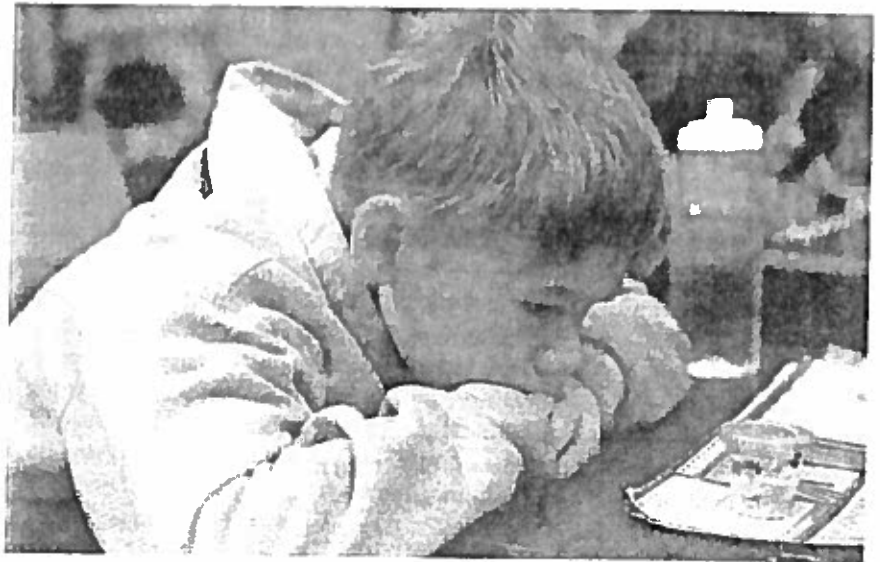
"SELF-REGULATION IS A CRITICAL SKILL THAT NEEDS EXPLICIT, INTENTIONAL FOCUS IN THE SCHOOL CURRICULUM. IT HAS SUCH LONG-RANGE IMPLICATIONS FOR KIDS' FUNCTIONING."

profit advocacy group, has allocated \$7 million this year to establish this type of teaching as an essential part of education. Ohio congressman Tim Ryan, along with representatives Judy Biggert of Illinois and Dale E. Kildee of Michigan, introduced the Academic, Social, and Emotional Learning Act of 2011 to "expand the availability of programs that teach students skills such as problem-solving, conflict resolution, responsible decision-making, relationship building, goal-setting and self discipline," according to the CASEL Web site. This pending legislation is currently awaiting consideration by the House of Representatives.

Meanwhile teachers are already sprinkling the school day with breathing exercises, mood meters, demonstrations of distressed amygdalas, facial-expression cards, and the like, looking for the essential recipe that will nourish children to become the kind of adults we want in the world. Data support each ingredient, and initial studies of these add-on curricula are largely producing positive results. Measuring executive function in children is still an imperfect science, however, making outcomes hard to assess. In addition, the active ingredients of these multipart, "cocktail" interventions are not always obvious, leading researchers to make some guesses in the programs' designs. Yet many educators are toasting their promise—and the accompanying possibility of shaping the character of the developing mind.

I Can't Wait!

Back in the late 1960s psychologist Walter Mischel, then at Stanford University, and his colleagues offered preschoolers attending the Bing Nursery School a choice: they could pick out a cookie, pretzel or marshmallow and eat it now, or if they waited a while, they would get two treats instead of one. Fast-forward to high school: the kids who could wait for the second treat had higher SAT scores. On average, 210 points separated the student who could wait 15 minutes at four years old and the one who stalled only 30 seconds. The patient preschoolers also were better able to pay attention as adolescents; they found it easier to maintain friendships and were less likely to display behavioral problems at school and at home. Mischel trailed this clan into their 30s. He found that the ones who had staved off



temptation as children were thinner and less likely to have had drug problems as adults.

From the other side of the globe, last year psychologist Terrie E. Moffitt of Duke University and her colleagues similarly reported a strong connection between self-control and success in 1,000 kids born in Dunedin, New Zealand. Every other year teachers and parents evaluated each child between the ages of three and 11 on his or her levels of aggression, hyperactivity, lack of persistence, inattention and impulsivity. These ratings, along with those from the children themselves, led to a self-control score for every child.

At 32 years old, the boys and girls who had had lower scores were poorer, had worse health, and were more likely to have committed a crime than those exhibiting more self-control. Poor ratings were a stronger predictor of financial troubles than was social class or IQ. In a separate set of 500 sibling pairs, the researchers found that despite a shared family background, the sibling with lower self-control was more likely to smoke, engage in antisocial behaviors and struggle in school.

These studies and others suggest self-control might be a stable characteristic. Yet Moffitt's team noticed that some of the Dunedin children improved their scores, as measured by a personality assessment in young adulthood. Mischel, now at Columbia University, and his colleagues also found that children

A third-grade boy uses mindfulness, an unemotional focus on the present, to observe changes in a caterpillar. This type of exercise tunes brain regions essential for success in school and later life.

THE BREATHING CALMS THE EMOTIONAL STORM, MAKING THE SKIES FOR LEARNING BLUE AGAIN. FOCUSING ON BREATHING TEACHES KIDS TO PAY ATTENTION TO **MOMENT-BY-MOMENT EXPERIENCE**.

from low-income families in the Bronx had more trouble delaying gratification than did wealthier kids from Palo Alto, suggesting that kids from richer families may be exposed to strategies that facilitate patience more often. "Self-control is malleable, but it is easier for some than for others," Mischel concludes.

Researchers and educators are now testing out different strategies for teaching these pivotal skills. MindUP, one of the more promising initiatives, grew out of Hawn's fascination with brain science as a vehicle for self-improvement. While she was living in Vancouver in 2002, her thoughts turned to children. She invited educational psychologists, neuroscientists and teachers to develop a new curriculum with a brain science scaffold that centered on social and emotional learning. Now MindUP has spread to more than 75 U.S. schools, nearly 175 in Canada, seven in the U.K., two in Australia and one in Venezuela.

Breathe

"What does the breathing do?" Morris asks her class.

"It calms your amygdala down," offers one child.

"It will make your prefrontal cortex so much smarter!" says another.

Morris's charges have become miniature authorities on brain anatomy. The amygdala, at the center of the brain, is a hub of emotional responses, they will tell you. The prefrontal cortex, which blankets part of the brain's surface just behind the forehead, is the seat of executive function. It regulates our emotions, thoughts and actions. The two regions are connected, and their relationship is deep. A storm of emotions raging in the amygdala can weaken the prefrontal cortex, hampering our ability to think and to learn. Kids under a lot of emotional stress, a condition more prevalent in lower-income families, do worse in school because the stress itself impairs executive function [see "Treating a Toxin to Learning," on page 64].

The breathing, as the children report, calms the emotional storm, making the skies for learning blue again. By focusing on their breath, they are learning to pay attention to moment-by-moment experience without judging or thinking too deeply about it. This type of dispassionate focus on the present, called mindfulness, helps to ward off stress that arises from "time travel" into the remembered past, leading to rumination, or the imagined future, spawning anxiety. "It helps me as a teacher because I have a calmer class and I'm calmer," says Marianne



Prins, a gregarious 26-year veteran teacher who teaches MindUP to third graders at Sir William Van Horne Elementary School, also in Vancouver.

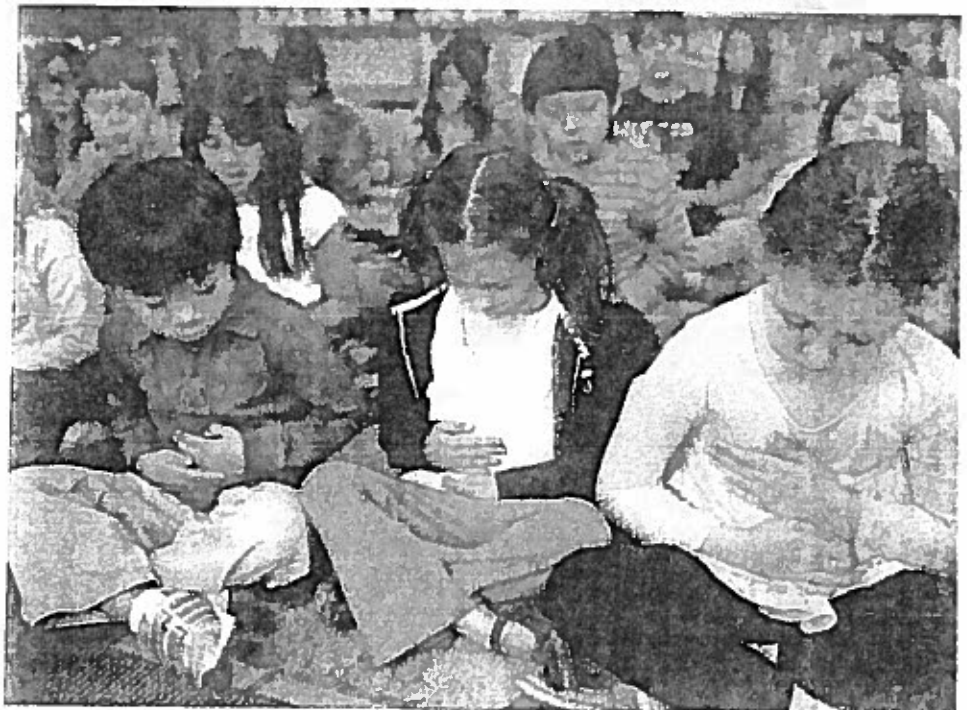
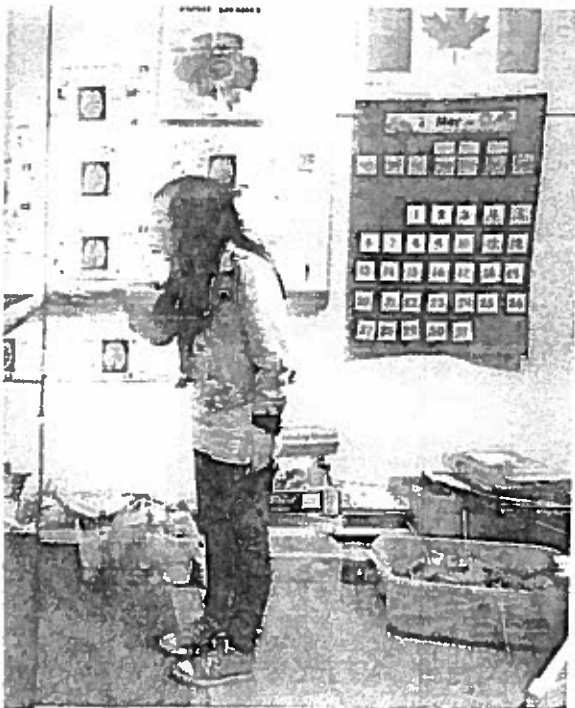
A large body of data shows that mindfulness training helps to reduce stress-related diseases in adults. In children, a smattering of pilot studies indicates that it calms healthy kids and reduces anxiety or anxiety-related academic difficulties in nervous students. In a 2009 study neuroscientist Kirk Warren Brown of Virginia Commonwealth University and his colleagues coached teenagers in an outpatient psychiatric facility to engage in several forms of meditation (sitting, walking and body scan, which involves systematically focusing on and relaxing different body parts while lying down). After eight classes conducted over as many weeks, the teens reported significantly less anxiety, stress, interpersonal problems and symptoms of depression than did those who did not take the classes.

MindUP seems to accomplish something similar. In a study presented in May at the Developmental Contemplative Science meeting in Toronto, Schonert-Reichl and doctoral student Molly Stewart Lawlor and their colleagues measured levels of the stress hormone cortisol in 99 fourth and fifth graders in four local schools in March and again in June, a tumultuous month for students as they wrap up their classes for the year. Initially they saw a healthy hormonal pattern in all the children: cortisol peaked one hour after waking and then declined steeply during the day. For the kids who participated in MindUP, the same rise and fall was recorded in June. In contrast, the

cortisol levels of kids in the comparison classrooms were flat throughout the day, a pattern indicative of chronic stress. "Our hypothesis is that MindUP buffered kids from that end-of-year stress," Lawlor says.

The breathing also may burnish executive function more directly. In this meditationlike practice, kids learn to inhibit the urge to elaborate on thoughts and feelings that pop into consciousness. The effort helps them resolve mental conflict induced by competing stimuli, or goals, a skill needed to prioritize. Such conflict monitoring, an ability related to attention, has been linked to better math achievement in school, higher IQ and less antisocial behavior. In a study published in 2007 psychologist Michael Posner of the University of Oregon and his co-workers randomly assigned a group of Chinese college students to five daily 20-minute meditation sessions. Compared with a group taught an exercise involving the relaxation of different body parts, these students showed significantly better scores on a computerized test of attention and conflict monitoring. In 2011 a team led by neuroscientist Amishi Jha at the University of Miami reported similar improvements on this test among 13- to 15-year-olds at a school in India that offered daily transcendental meditation exercises for

Various breathing exercises can train attention, lessen stress and help children regulate their emotions. In one, they close their eyes and tune out all other distractions (far right and far left). In another, they adjust their puffs to gently shift a cotton ball into a partner's hand (center).



PROGRAMS SUCH AS MINDUP WORK AS **SPEED AND AGILITY TRAINING** FOR THE BRAIN. “YOU EXERCISE THE MUSCLE OF THE PREFRONTAL CORTEX—AND GET **SPILLOVER INTO ACADEMICS.**”

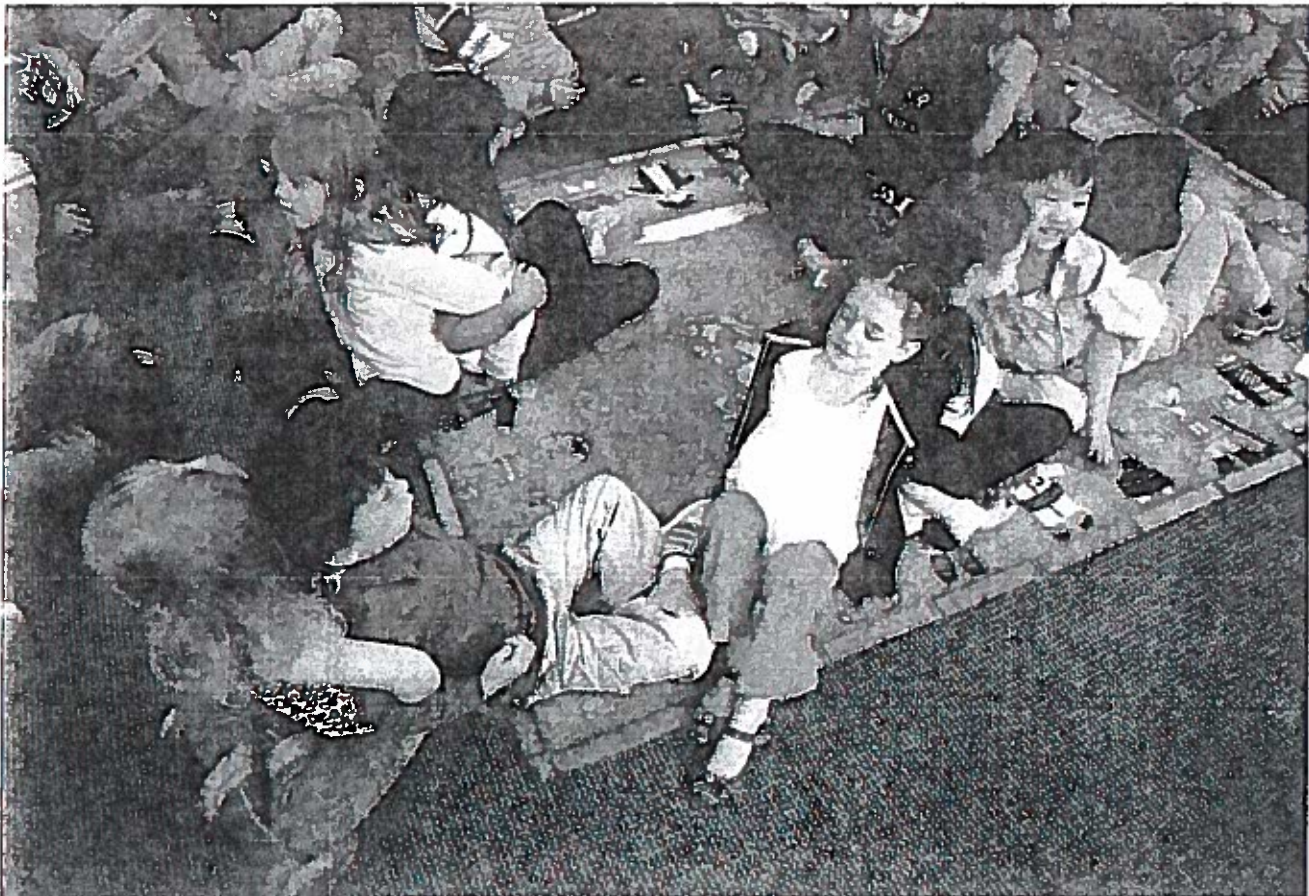
one to three years, as compared with teens in a school that did not offer this practice.

Does It Feel Rough?

On an overcast morning in late February, Prins dumps a basket of gray stones in the center of a circle of students gathered on the rug. She calls different students to pick from the pile. After everyone has a stone, Prins instructs the students to examine theirs for any special marks, to close their eyes and imagine the rock, and to rub it against their cheeks. “Does it feel rough?” she asks brightly. Mindful-

ness also means paying close attention to the sensory qualities of things—such as the texture, colors, hollows and ridges of a rock. When all the students put their stone back in the pile, the minerals resembled anonymous bits of gravel. The students’ job: to find their stone again. In the first round of this rock game the kids had trouble, but in the second, every student recovered the stone they had inspected. Mindfulness takes practice.

In other venues, these kinds of exercises, in combination with breathing, have had measurable effects on kids’ executive function. In 2010 behavioral geneticist Susan L. Smalley of the University of California, Los Angeles, and her colleagues reported providing training in mindfulness to 32 second and third graders twice a week for eight weeks. The training included sitting meditation, along with activities and games that pro-





more sensory awareness and awareness of others. Teachers and parents completed questionnaires assessing the children's inhibitory skills, control of attention, working memory, and emotional regulation before and after the training. The results indicated that exercising mindfulness significantly improved these aptitudes on the whole, as well as particular skills, compared with 32 children assigned to silent reading. The training gave the biggest boost to those whose capacities were initially weaker, a finding consistent with work by Smalley's team hinting that mindfulness training could benefit adolescents with attention-deficit hyperactivity disorder.

Kids who are naturally more mindful also perform better on tests of inhibitory control. In a study published in 2011 doctoral student Eva Oberle of the University of British Columbia, along with Schonert-Reichl, Lawlor and their colleagues, asked 99 fourth and fifth graders to complete a test that asks questions reflecting mindless states such as: "I do jobs or tasks automatically without being aware of what I am doing" and "I snack without being aware of what I am eating." The higher a kid scored on this test of "mindful attention awareness," the more accurate he or she was on a computerized assessment of inhibitory control.

Of course, ordinary school exercises the brain's executive control centers. You cannot read or do a math problem without tapping your working memory, training your focus or suppressing your wish to chat with a friend instead. Yet school is akin to a team practice that drills sport-related skills but does not maximize an athlete's quadriceps power or smooth out her running stride. Programs such as MindUP work as speed and agility training for the brain. "If you teach explicit ways to self-regulate, you exercise the muscle of the prefrontal cortex—and get

spillover into academics," Schonert-Reichl says. In her recent study MindUP participants improved more on computerized tests of attention and inhibitory control than did kids in the comparison classes. They also had higher ratings in math on their end-of-year report cards.

These results are not news to teachers. "I can't stress enough how much this has improved my teaching and the academic skills of the children," says Morris, who began using MindUP three years ago. In 2005, the year MindUP debuted in Vancouver, 17 teachers were trained. That number has ballooned to 1,000. "It kind of went viral," Schonert-Reichl says. "There are wait lists for training. I've never seen anything like it."

Green Means Go

Decades before Hawn became interested in education, developmental psychologist Mark T. Greenberg, then at the University of Washington, made one of the first forays into social-emotional learning. Greenberg had been trying to help deaf individuals with self-regulation deficits control their behavior

Marianne Prins gathers her third graders for a mindfulness lesson (left). Each child picks a rock and examines it (right). The test: Can you find your rock again after putting it back in the pile with the others?

(The Author)

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TEACHING CHILDREN TO **PRETEND** THAT A MARSHMALLOW WAS ONLY A PICTURE HELPED THEM RESIST THE TREAT FOR MUCH LONGER. "IF THEY **IMAGINE** A PICTURE, THEY CAN WAIT AS IF IT WERE A PICTURE."

by teaching them words for emotions. He realized that the strategies he was using—having people sign or talk out loud to themselves or exposing them to words as visual aids—also seemed to help hearing children control their behavior. "I was interested in language as a self-regulation mechanism in preschool," Greenberg recalls.

In the 1980s Greenberg and Seattle psychologist Carol A. Kusché created Promoting Alternative Thinking Strategies (PATHS), now used in over 3,000 schools in more than 30 U.S. states and as many foreign countries. In one part of the curriculum, kids receive small labeled cards with faces expressing different feelings. They personalize the cards and use them to communicate their emotions throughout the day. Self-regulation is also taught explicitly with the aid of a traffic signal. If students face a difficult or frustrating situation, they focus on the red light, which means "Stop—Calm Down." They are supposed to describe the problem and their feelings about it. Next comes yellow, "Go Slow—Think," that is, make a plan. Green means "Go—Try My Plan."

In a study published in 2010 Greenberg, now at Pennsylvania State University, and his colleagues tested these techniques in 2,937 students, many of them disadvantaged, as they advanced from first through third grade in schools in Nashville, Seattle and rural Pennsylvania. According to teacher and peer evaluations, the kids in the 190 classrooms that received the PATHS instruction became less aggressive and more cooperative and helpful, compared with those in 180 classrooms that did not include the intervention. The kids getting PATHS were also more academically engaged—showing more self-control during school-based tasks, teachers said—than those getting instruction as usual.

PATHS may produce these gains by boosting executive function. Several years ago Greenberg, along with Nathaniel R.

Riggs of the University of Southern California and their colleagues, tested the inhibitory control of 318 second and third graders from four schools in Seattle. In two of the schools, teachers gave 20 to 30 minutes of PATHS lessons three times a week from October through March. A year later these students had better inhibitory control than did kids in the two other schools.

Visualizing

Think of something that happened in the house. Draw what you see in your head. (don't forget to add lots of details! Think of characters, setting and plot) Don't Laugh at Me



Write one sentence explaining your picture.

Don't laugh at people if they are thin or fat.

In a lesson designed to nurture empathy and compassion, a child reacts to the song and accompanying book, "Don't Laugh at Me," in which people who feel ostracized ask for acceptance from others.

Red Riding Hood's Problem

In part because of MindUP, Prins presides over a few of the school's most anxious children. Almost as soon as her lesson began one morning, a little boy burst into tears, the reason unclear. "His amygdala is all shook up," Prins says. She picks up a two-liter soda bottle filled with water and sand, turns it upside down and agitates it. "What can we do in our class when our amygdala is shaken up?" she asks. Some of the kids made a "peace" sign with their fingers. The gesture means a child needs to take a walk while his amygdala calms down.

In Prins's class, a diagram of the brain with a labeled prefrontal cortex, amygdala and hippocampus, a storehouse for memories, hangs on the wall. Prins reviews the structures and their roles daily and makes connections to her lessons. "Red Riding Hood had a problem with her amygdala with

the wolf," she once told her class. One MindUP lesson for grades three through five centers on the anatomy and function of a neuron; another is a discussion of the brain chemistry of pleasure and reward.

Teachers say their students are fascinated by how their brain works. Yet the main purpose of the lessons is more philosophical than scientific. "It gives kids a certain level of empowerment," Schonert-Reichl says. "They learn they can change their mind." The exercise of thinking about thinking, known as metacognition, is designed to give kids better control over how they think and feel—directing their attention more appropriately or calm-

ing themselves down—in ways that could enhance learning.

Do the neuroanatomy lessons really improve self-control? “I don’t think kids need to know about the amygdala,” says Adele Diamond, a developmental cognitive neuroscientist at the University of British Columbia. “But kids enjoy learning about the brain.” And yet some data hint that Hawn might be on to something.

Keep Away

Mischel and psychologist Angela L. Duckworth of the University of Pennsylvania have found that one of the best ways to summon restraint is to separate yourself from whatever is provoking an emotional response. Kids who covered their cookie, Mischel says, could linger 18 minutes without indulging, whereas those who left the treat exposed bit into it in less than a minute. Teaching children to pretend that a marshmallow was only a picture stretched out their ability to resist from one minute to a quarter of an hour. “If they imagine a picture, they can wait as if it were a picture,” Mischel says.

In a study published in 2011 Mischel and Duckworth, along with psychologist Ethan Kross of the University of Michigan, and their colleagues established the power of distancing on cooling hot emotions in children. They asked 110 fifth graders from a public school to recall a personal experience that made them very angry. Some of the kids imagined it was happening to them again. Others were instructed to step back and watch themselves and the event unfold from a distance. All the students then wrote an essay in which they reflected on their experiences. In their essays, students adopting the distant perspective dwelled considerably less on the event’s emotional features and included fewer blame statements and more insightful re-appraisals of what happened.

Learning about the brain might help kids distance themselves from their emotions by putting them in an abstract context. Mindfulness also involves stepping back from your thoughts and feelings. Moreover, the use of language, as in PATHS, can put space between the impulse to act and the action itself.

Kross and Duckworth are now planning to test the broad applicability of the distancing technique on groups of children in grades five through nine attending Philadelphia charter schools. The psychologists will coach the kids to reflect on their



actions during different self-control tasks by encouraging them to either focus on their perspective by talking to themselves using language such as “I” and “my” or cultivate a sense of distance by referring to themselves in the third person. Then the researchers will measure the children’s capacity to persevere in a boring work task (sorting chips by color), wait for a delayed reward (seven dollars in a week versus five dollars now) and control their anger related to a recollected experience.

A girl flips and shakes a bottle filled with sand and water to show the tumult in her brain when she feels stress. When she rights the bottle and the sand settles, she can see how long it takes her brain to revert to a calmer state in which it can make smart decisions.

For Good Measure

Tweaking the minds of children can be tricky, however. In as yet unpublished work, Vanderbilt’s Farran and her colleagues tested an intervention called Tools of the Mind, which uses self-talk, visual reminders and play to improve executive function in kids. Farran’s team randomly assigned the curriculum to 32 prekindergarten classrooms in Tennessee and North Carolina. They measured the students’ executive function and achievement before and after eight months of the program. Children did show gains, but no more so than did kids in 28 classrooms that did not offer Tools. “The measures we have, including teacher ratings, did not show that the program was more effective than what they normally do in preschool,” Farran says.

Earlier studies had shown benefits from Tools when the pro-



This workout is for the brain, too. While they jump, jog and bring elbow to knee, these kids practice paying attention to signals from their bodies and connecting them to emotions. Monitoring both types of feelings is thought to improve the ability to manage your moods and control your behavior.

gram was simpler, involving 40 activities instead of the 65 now prescribed. Farran believes this proliferation of elements might be diluting the effectiveness of the program. A second issue is that no perfect measure of executive function exists, perhaps because the concept itself is still somewhat ill defined. That ambiguity has not stopped teachers such as Prins, however, who see the positive effects of brain training on a daily basis.

Outside of Prins's class in Vancouver, the slush was melting and water dripped from every branch and gutter. Inside, the kids did "brain exercises." Smiling and panting, they touched their right elbow to left knee. They rubbed their tummies while patting their heads. They did jumping jacks. The choreography was designed to optimally excite the prefrontal cortex. Yet the children's faces indicated that the exact moves might not matter. In Schonert-Reichl's latest investigation, those in the MindUP classes became more optimistic, had more positive emotions and liked school better than other students did. And it is well known that the neurotransmitter dopamine, associated with joy and pleasure, primes the prefrontal cortex for action. "School needs

to be more fun," British Columbia's Diamond says. "Kids will buy in. They will learn better." If the grown-ups succeed in making kids better thinkers, the kids should get the last laugh. **M**

(Further Reading)

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- ◆ Interventions Shown to Aid Executive Function Development in Children 4 to 12 Years Old. Adele Diamond and Kathleen Lee in *Science*, Vol. 333, pages 959-964; August 19, 2011.
- ◆ Behavioral and Neural Correlates of Delay of Gratification 40 Years Later. B. J. Casey et al. in *Proceedings of the National Academy of Sciences USA*, Vol. 108, No. 6, pages 14,998-15,003; September 6, 2011.
- ◆ Collaborative for Academic, Social, and Emotional Learning: <http://casel.org>
- ◆ The Hawn Foundation: MindUP: www.thehawnfoundation.org/mindup