Resiliency, Inc. News

September 2010

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Issue Focus: Learning and memory as well as a bonus section on gestures

In This Issue

Up-coming Events

Resiliency, Inc. CEO will be speaking at:

River Rouge School District
September 21, 2010
River Rouge, MI

Harrisburg School District
September 24, 2010
Harrisburg, PA

Lebanon School District
September 27 & 28, 2010
Lebanon, PA

South Lake School District
October 7, 2010
St Clair Shores, MI

Pocono Mountain School District
October 11, 2010
Tobyhanna, PA

Lehigh University
October 20, 2010
Lehigh Valley, PA

Inkster School District
Monthly
Inkster, MI

The Three Levels of Learning

By Horacio Sanchez

Learning can be broken down into three basic components: core information, principles and applications, and higher level thinking. Teachers should consider this when providing instruction. There are two well established premises that are the foundation of this approach to delivering instruction. The first principle is the brain can only focus on one thing at a time. Earl Miller, professor of neuroscience at MIT states, "People can't multitask very well, and when people say they can, they're deluding themselves." When we think we are multitasking the brain is actually switching from one task to the other task rapidly. He states that some tasks are almost impossible to do simultaneously, like writing an e-mail and talking on the phone at the same time. "You cannot focus on one while doing the other. That is because they both involve communicating via speech or the written word, and so there's a lot of conflict between the two types of tasks in the brain." Magnetic resonance imaging shows that in cases of multitasking the brain actually struggles to complete both tasks.

The rules for multitasking are as follows: the brain can do it best when both tasks have been done so frequently that they are almost automated, as long as the tasks do not occupy the same areas of the brain. However, the performance of both tasks will suffer slightly. This slight drop in performance is low enough that people often delude themselves into thinking that they performed optimally. Rule two, when doing one new task and one automated task, the brain will focus its' energy on the new task. The final rule is that if both tasks are new, the brain will struggle to do both, often resulting in a level of chemical imbalance that impedes learning and performance.

The second principle is that the brain learns by making connections. The following article by Professor Greene will go into this topic in more detail. However, there are also some established truths about the connection process that will be addressed in this article. The first is that the brain makes sophisticated connections while you sleep. This means students with emotional disorders and students exposed to persistent stress will make fewer connections in their lifetimes than the average person. This is because emotional disorders and exposure to stress both negatively impact sleeping resulting in less connections being made. Therefore, the

Agency Information:

Resiliency Inc. provides a revolutionary paradigm that trains individuals on how to successfully educate and treat the most difficult to serve children and their families.

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Getting the Most From Your Memory

- **Think about relevant connections between new information and what you already know.**
- **Explain things to yourself as if you were teaching someone else.**
- **Organize the information in some logical order.**
- **Spread out learning.**
- **Practice early and often.**

achievement gap increases every night. The second truth is that we tend to make the most connections to subject matter we are the most adept at. This means more things are connected to areas of expertise. Consider a great cook, when they view the world it seems that they associate everything to the cooking experience or to food. The negative finding here is that individuals who lack well developed areas of knowledge will make less connections overall. In other words, "the smart get smarter." The third truth is that making associations to things people know well is the least taxing to the human brain and is most likely to be understood.

Core Information

The three above truths clearly illustrate that all curriculums must have core information that everyone has retained in an exact manner, since the human brain will always gravitate first to what is familiar. If teachers do not identify certain information to be essential to the learning process, then students will all hear a range of information and gravitate only to what makes sense to each of them based on prior knowledge alone. This would result in the learning process being unpredictable because it would be based on whatever connections are naturally formed. However, teachers assume that certain information is learned regardless of the ease in which a student is able to connect in to what he or she has already learned. Core information is fundamental elements that must be automated for a particular type of learning to take place. For example, in reading, core information is phonemic awareness. If a student struggles too much to produce sounds, the brain will be unable to focus on words and comprehension. The goal with core information is to stimulate sensory input that occur simultaneously in order to create a network; thereby, improving long-term potentiation (LTP). LTP is a persistent increase in synaptic strength following high-frequency stimulation of a chemical synapse. Learning and memory are possible thanks to the strengthening of synapses between nerve cells (Nicoll 2010). This learning process begins at the hippocampus. The hippocampus is also responsible for coordinating all sensory input. It has been proven that when information stimulates multiple senses simultaneously it improves not only recall but the speed of recall. However, for automation to truly occur repetition is required. Simply put, core information must be taught by simultaneously stimulating sensory inputs in a repeated manner.

Principles and Applications

Principles and applications are basically what teachers want students to do with the core information. For example, a student who is taught phonemic awareness and grade appropriate sight words can be asked to produce sentences, paragraphs and even essays. However, the simple truth is that if a student has not mastered phonemic awareness and does not have an appropriate level of sight words, he or she will be unable to do these applications. The brain will work too hard on producing the words that sentence structure and meaning will suffer. Remember the rule; the brain will struggle to focus on two new things simultaneously, which is why some core information for every subject matter must be automated.

Higher Level Thinking

Higher level thinking in an academic setting is nothing more than the brain putting new information that has been taught together. The problem is that students who have not mastered core information to the point of automation, or have not manipulated principles and applications enough will be unable to make assumed connections. It has been established that children at any age can engage in higher level thinking that is based on the core information provided and the applications that they have been trained to make (see December Newsletter 2009 on Advanced Thinking).

How to Implement the Three Levels of Learning in a Classroom Setting

- Select a few core elements. Teach it in a manner that stimulates the senses simultaneously: movement, music, visuals, and words (catch phrases and chunking).
- Establish set times throughout the school year to quickly review core information. Remember, without core information being automated, students cannot achieve advance learning such as applications and making connections.
- When students seek to apply what they have learned, make sure that the principles and applications allow for them to manipulate it in more ways than just verbal or written. For example, when applying what they have learned about sentence structure let the students move cards that have parts of speech around; let them tap out rhythm of sentence structure; let them draw the sequence of a sentence; let them watch videos on sentence composition; let them hear how others compose sentences; let them play games with sentences. The goal is for them to manipulate what they have learned until they reach a level of comfort and familiarity.
- Establish learning experiences that guide students to put what they have learned together without the teacher doing it for them. The teacher takes on the role of coach, setting up clever problems or situations that guide the students to putting things together. For example, if the higher thinking goal is to be able to produce expressive writing, the teacher could have a collection of sentences on strips of paper and explain that these sentences when put together tell a story and solve a mystery. The story can be put together many ways; the only limit is students' imaginations. Then once the students achieve this they can make their own story puzzle.

It is important that teachers begin to look at each segment of the curriculum in this manner or they might be frustrated when students are slow to obtain automation, apply principles, or consistently fail to produce higher level thinking.

Brain Nugget

Brain cells that fire together during an experience can form a permanent connection.

When the same network of the brain cells refire later, we experience memory.

New experiences can lead a network of cells to develop further connections to an existing network adding or modifying memories.

Making Connections

By Anthony J. Greene

For most of us, memory is not like a video recording–or a notebook, a photograph, a hard drive or any of the other common storage devices to which it has been compared. It is much more like a web of connections between people and things. Indeed, recent research has shown that some people who lose their memory also lose the ability to connect things to each other in their mind. And it is the connections that let us understand cause and effect, learn from our mistakes and anticipate the future.

The modern view of memory has its roots in the 1930s and 1940s, when a series of discoveries, most notably by psychologist Karl Lashley of the University of Chicago and later of Harvard, revealed that learning and memory are not sequestered in their own storage banks but are distributed across the entire cerebral cortex. Lashley set out to discover the location of the learning center of the brain by systematically disconnecting different regions of the cerebral cortex in a number of different rats. To his surprise, all the rats showed some degree of mild learning impairment, but none was seriously impaired.

The significance of these findings is profound. It means that memory is dispersed, forming in the regions of the brain responsible for language, vision, hearing, emotions and other sensory functions. It means that learning and memory arise from changes in neurons. And it means that a small reminder can reactivate a network of neurons wired together in the course of registering an event, allowing you to experience the event anew.

Another piece of the puzzle fell into place in the 1950s, after some surprising observations of a few individuals with almost complete amnesia. In the most compelling case, a 27-year-old Connecticut man, known as HM but identified as Henry Gustav Molaison after his death in 2008, had severe epilepsy that was not responding well to medication. It was a sadly common practice in those days to treat epilepsy by removing or disconnecting substantial portions of brain tissue. The performance of the brain resection on HM resulted in one of the most extreme cases of amnesia ever recorded. His case and others revealed that damage to the hippocampus, a horseshoe-shaped structure located deep below the surface folds of the cerebral cortex, leaves people almost completely unable to acquire new memories or to learn complex associations.

The hippocampus turned out to be not the source or storehouse of memories but rather an essential mediator in the information. The hippocampus serves as a kind of neural switchboard, connecting the distant cortical regions for language, visions and the senses in order to create memory.

Hippocampal amnesiacs appear to have impairments that go well beyond the loss of memory creation. They also have severe difficulty imagining future events, living instead in a fragmented, disconnected reality. To a mind that cannot make connections, each instance is an isolated event without continuity, each thought fleeting and unrelated, each precept without relevance, each person a stranger, every event unexpected.

Making predictions requires us to weigh multiple variables, which in turn takes a brain big enough to learn all the relations involved. Indeed, social interactions can pose our greatest predictive challenges and may well have been a major impetus, among our prehuman ancestors, for the evolution of astounding learning abilities.

At the root of the flexibility of learning and memory is generalization. My one-year old son recently has a wonderful time feeding some ducks and soon was able to point out a duck with no problem. He also over-generalizes: in his lexicon, geese and swans are also ducks. Eventually he will learn to discriminate among water fowls. Generalization and discrimination are the *yin* and *yan* of learning and memory–complementary processes that ultimately work together.

As we amass knowledge over the course of our life and connect events in our memory, we learn to model complex contingencies and make inferences about novel relations–higher level thinking.

So what are the implications for teachers? For teachers to start by tying new learning to existing associations–by engaging in contextual learning. For example, say you were teaching students about a historical novel such as *The Scarlet Letter*. Before you might utter the name *"Hester Prynne,"* you might first discuss how the Puritan society mirrored truths your students already know: religious leaders do not always live up to their convictions; the judgment of peers is weighty and lasting; concealed shame eats at your soul. You could next introduce ways in which the Puritans universe was different: living on the verge of survival necessitated collective conformity; technology was primitive; religious convictions were a community affair. Your students can then paint a picture of the characters' way of life, from family relations to dogs chasing pigs down the street. As their knowledge of the story's setting deepens, they can begin to take in abstract ideas, such as the political and legal structures of Puritan society. By this time students will have formed an intricate e=web of associations that will let them weave the lessons of the book into their own thinking.

Connections help us anchor an ever more complicated body of knowledge to about how the world works and negotiate the complex structures around us. Memory is a dynamic aspect of our intellect. And as our understanding of memory grows deeper, we see that the connections we make between the people, places and things in our lives, between the past, present and future, do not themselves spring from memory. Memory springs from connections.

Anthony J. Greene is associate professor of psychology at the University of Wisconsin-Milwaukee, where he runs a learning and memory lab.

Additional Articles

Leo, P.D., Greene, A.J. (2008). Is awareness necessary for true inference? Memory & Cognition, 36, 1079-1086.

Greene, A.J. (2008). Implicit analogy: New direct evidence and a challenge to the theory of memory. Behavioral & Brain Sciences.

Brain Fact

Get Your Teen to Bed

Columbia University scientists found that depression was 24 percent more common in teens whose parents let them go to bed at midnight or later than in kids whose moms and dads require them to hit the pillow by 10 P.M. The night owl is also 20 percent more likely to have suicidal thoughts.

– **Jordan Lite**

Brain Nugget

Congenitally blind people move their hands when they talk.

Children who are on the verge of mastering a task advertise this fact in their gestures.

Encouraging students to gesture can bring out their implicit knowledge and enhance learning.

Why Established Gestures to Cue Behaviors Play Such a Vital Role in Behavioral Change

By Horacio Sanchez

Resiliency Inc. has placed a lot of emphasis on the use of hand gestures to reinforce new behaviors and learning. The reasons for this are deeply rooted in science. The primitive brain established gestures as a form of hardwired communication prior to the inception of language. Although language has made us less conscious of the presence and impact of hand movements, gestures retain their importance in the influence of the human brain. Therefore, schools should seek whenever possible to reinforce behavioral practices through the use of gestures that serve to not only remind students of what they should be doing but to influence compliance.

Why Implement Hand Gestures to Cue Behaviors?

- It is such a natural process that all people do it without ever being taught. People who think that they are just communicating with spoken words are often unaware that they are gesturing to denote what is important. Hand gestures are so natural that deaf children not formally taught sign language will naturally develop a sign language of their own (Goldin-Meadow 2010).
- Hand gestures simplify directions in the midst of high stimuli or competing distractions (Kendon 2004). This is important in schools since during hallway transitions and even in the classrooms, students are constantly distracted by competing stimuli.
- Most importantly, gestures are subconsciously absorbed and have great power and influence on our behaviors. On the other hand, language in times of high stimuli often increases chemical imbalance and hinders compliance.

Common Mistakes in Instituting Gestures to Cue Behaviors

Gestures must be *set* in order for them to have subconscious influence. The term *set* in this situation means that the student must not only know what the gesture means but has practiced responding to it appropriately. This means teachers must establish a situation in which students practice the desired behavior when cued prior to the gesture cuing the behavior in a more natural setting. Some recommendations to set gestures correctly:

- Establish a fun way to practice. Games are great. Associating a more positive feeling with the gesture will anchor it in the human brain as a desirable practice. For example, a gesture used to prompt students to pay close attention can be *set* with a quick game of Simon Says.
- Gestures can lose their effectiveness if the person using is does not expect it to work. The reason for this is that the primitive brain will see inconsistent nonverbals and become confused. This can be overcome by schools establishing a few key gestures school wide. This will promote consistency via the expectation that all staff utilize the same gesture for a designated behavior.
- Praise should be a common accompaniment to compliance. Students who struggle to follow directives need to know when they have done the action correctly. Praise helps these individuals know what the correct behavior is. Adults commonly only identify when the action is done incorrectly, which does not inform what the desired behavior should be.

Finally, gestures that trigger a new behavior serve a vital function in triggering motivation (Simmons et al. 2007). A gesture or symbol that is appropriately set will eventually secrete motivation for actions associated with reward. This means that the behavior will have a better opportunity to become a long-term practice.

In the next article Susan Goldin-Meadow writes about how gestures can be used to improve instructions.

Brain Fact

Sit up Straight

Good posture boosts self-esteem. When you were growing up your mother use to say sit up straight. And now it turns out that sitting up straight can also improve how you feel about yourself, according to a study in the October 2009 issue of the European Journal of Social Psychology, researchers asked college students to rate themselves on how good they would be as job candidates and employees. Those told to sit up straight with their chest out gave themselves higher ratings than those instructed to slouch while filling out the rating forms.

– **Harvey Black**

Hands in the Air

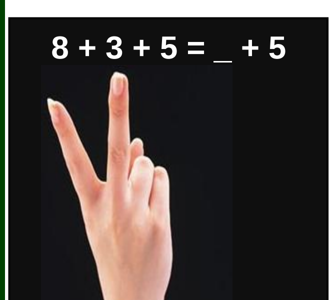
By Susan Goldin-Meadow

The act of gesturing not only reflects what people know but can, if deliberately encouraged, change the way they think–often for the better. Telling kids to gesture while they talk can speed learning. In a study published in 2007 psychologists Sara Broader and colleagues asked 70 third and fourth graders to solve a set of mathematical equivalence problems (such as 6 + 4 + 2 = _ + 2) twice. After all the students took a first crack at these problems, we told some of them to move their hands and the others to use just words, while they explained their answers. We then gave all the children a lesson in how to work out the problems and asked them to solve a new set of problems. Students who gestured prior to the lesson answered more problems correctly than did those who kept their hands still. Moving their hands helped the children learn the information presented in the lesson.

When we looked closely, we noticed that the children who gestured suggested new strategies with their hands that they had not previously expressed in words or actions. For example, one child pointed at the 6, the 4 and the 2 on the left and then produced a take-away gesture near the 2 on the right, illustrating an “add up all the numbers on the left and take away the number on the right” strategy. This knowledge remained dormant in the children who were not told to gesture, although we believe they must have had it, because all the children in our study solved and explained the problems in exactly the same way before the lesson. Thus, gesture not only reflects the presence of implicit knowledge but also can help bring it to the forefront of a child’s mind, furthering his or her progress as a learner.

In addition to encouraging kids to gesture at will, teachers can also instruct children to produce specific gestures that capture particular concepts. In a study published in 2008, I found that instructing kids to produce particular gestures–as opposed to letting them make whatever gestures they want–helps kids remember what they learn. Before giving 84 third and fourth-grade children a math lesson, Cook, Mitchell and I taught one group of children to say “I want to make one side equal to the other side” (the equalizer strategy) and to produce hand movements conveying that idea (sweep the left palm under the left side of the equation, then sweep the right palm under the right side of the equation). We told anther group to repeat the words only and a third group to simply make the hand movements.

Then Cook taught the children to apply the equalizer strategy–using both gestures and speech–to a set of math problems of the same type. Before and after each problem, the children repeated the words or the gestures, or both. All of them solved the same number of problems correctly after the lesson, but when they were tested a month later using similar problems, only those who had gestured during the initial lesson continued to solve the problem correctly.



Next we wondered whether a teacher could introduce an idea or strategy only by directing a student to produce appropriate hand movements–without any overt verbal instruction. In a study published in 2009 we taught children the equalizer strategy verbally but introduced a different strategy (grouping) only by suggesting certain hand movements. For the equalizer strategy, all the kids were taught to say “I want to make one side equal to the other side” when solving problems such as 8 + 3 + 5 = _ + 5. We told some of them to simply say these words. Others repeated the words and made hand movements that grouped two of the addends: for 8 + 3 + 5 = _ + 5, children made their first

All over the world, it turns out that people judge others on two main qualities: warmth (whether they are friendly and well intentioned) and competence (whether they have the ability to deliver on those intentions).

When we meet a person, we immediately and often unconsciously assess him or her for both warmth and competence.

The good news is that if you come off cold or belong to a stereotyped group, you can try changing your image. Think about warmer moments before meeting people or addressing groups, let those nonverbals influence others.

-Cuddy, Fiske, and Glick

Study on Human Judgment

and middle fingers into a V and placed it under the 8 and the 3. Then they pointed at the blank with the same hand. To find out how much of the effect might be the result of just moving the hands, we asked a third group to recite the equalizer speech and use their hands to suggest grouping the wrong two numbers–making the V under the 3 + 5. In all cases, the teacher's verbal instruction referred to the equalizer strategy only.

Even though all the children talked about the equalizer method, the kids who gestured about the correct grouping strategy solved the most problems correctly. Perhaps even more encouraging, the kids who made a V under the wrong two numbers got more correct answers than did those who did not gesture about grouping at all–it seems they had extracted some aspect of grouping from their partially correct gesture. Thus, the children's ability to explain grouping after the lesson must have originated in their own gestures; they learned a new technique just by moving their hands in a particular way.

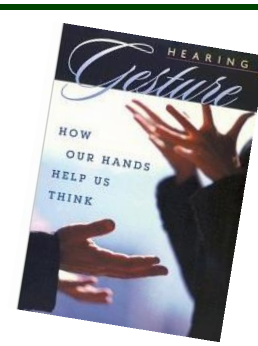
Gesturing may also aid learning by shouldering some of the cognitive burden. When a problem is hard, hand movements may accomplish some of the necessary "thinking," the way writing a problem down can make it easier to solve. In one of my team's studies, published in 2001, after giving children and adults a list of words to memorize, we told them to solve a math problem and to explain their solutions. For some of the problems (but not the others), participants gestured while they delivered their explanations. When the participants gestured, we found that they recalled more of the words on the list than when they did not–suggesting that gestures reduced the cognitive load of the math problem, leaving more brainpower available for remembering the words. Thus gesturing while talking could, in principle, lighten the load when narrating anything complicated or intricate.

In the classroom, gesture has additional uses:

- If teachers pay close attention to children's hand movements, they may be able to see the leading edge of the child's knowledge and thereby determine what the child is ready to learn next.
- Teachers can incorporate gestures into their lessons. Our research reveals that kids especially benefit when a teacher suggests one correct strategy in words and another in gestures, offering a gesture mismatch of their own.

Susan Goldin-Meadow is the Bearsdley Ruml Distinguished Service Professor in the Department of Psychology and Committee on Human Development at the University of Chicago.

Featured Reading



How Our Hands Help Us Think
Harvard University Press 2003
By Susan Goldin-Meadow

New Exciting Training and Consultation Services Offered by Resiliency Inc.

R E P






Lebanon School District Has Just Successfully Completed the Resiliency Education Program

I am in my ninth year as superintendent in Lebanon School District, and without a doubt our district's relationship with Resiliency, Inc., Horacio Sanchez, and his team over the past year, has resulted in a transformation in our district. Our staff is much more unified, and we have made substantial progress in addressing systemic issues in a relatively short time. The climate assessments, coupled with our participation in a week-long seminar on brain based research and the resiliency model, has made a district wide impact. Teachers told me that it was the best professional development experience they have had in their entire careers, and I agree with them. This is meaningful and applicable work.

- Marianne T. Bartley, Ed. D., Superintendent of Schools





Resiliency Education Program

REP trains school teams in a five-day, “trainer of trainers” model that is designed to mirror the brain-based learning process. This is the same process that school staff will utilize to implement the program in their school.

COMPETENCY- BASED

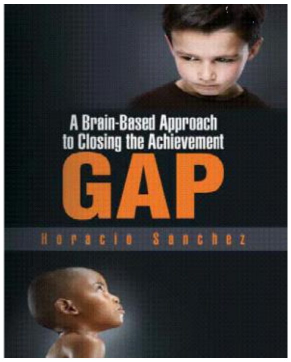
- The entire training is designed for participants to experience each lesson through brain based strategies.
- The REP approach requires participants to master essential skills through daily practice.
- REP is designed to overcome the limitations of traditional training by promoting the application of new learning.
- REP is designed to meet all the challenges of *No Child Left Behind*.

INTENSIVE - WHAT MAKES REP UNIQUE

- Participants experience the process and validate the approach.
- Schools are trained in teams rather than individually.
- The process ensures that each school will leave with a specific action plan that out lines implementation stages of school reform.

REP is recommended by the NEA as a best practice program for closing the achievement gap.

C.A.R.E.: Strategies for Closing the Achievement Gaps 2005



Thank you for making “A Brain-Based Approach to Closing the Achievement GAP” a top selling book. The feedback has been so positive. I am grateful and humbled by the response. A special thanks to all the districts that chose to put this book in the hands of every one of their teachers.

Horacio Sanchez

Chapter 18
The Role of Belief in Education

Your belief determines your action and your action determines your results, but first you have to believe.

—Mark Victor Hansen

The commonly used adage, “All students can learn and excel” provides an interesting paradox when viewed in light of brain science. Brain science calls into question if many educators really believe what they are saying. In the human brain, true belief is always evidenced by action.