EDUCATION & EMOTIONS

How Children Feel Affects How They Learn

By Kenneth Wesson

Children from troubled homes and rough neighborhoods were asked, "What do you want to be when you grow up?" Sadly, their answers consistently began with the phrase, "If I grow up..."

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"Students learn as much for *a teacher as they do* from *a teacher."*

—Linda Darling-Hammond, Stanford University

A man in a black trench coat strolls up to the opened classroom doorway, glances in, turns and continues walking. All eyes shift immediately and fixate on the potential intruder. Body orientation addresses the target until he is comfortably out of our sight, and we hear sighs of relief. Then, students refocus on the teacher and their concentration on learning resumes. But *does* student learning restart with no thought to the interruption? According to Dutch psychologist Nico Frijda, the answer is no. When the relevance-signaling systems in the brain are activated, our emotions initiate a quick situational appraisal to answer the emotionally-centered questions, *What was that? Friend or foe? Danger or opportunity?* The series of secondary questions in this emotional equation entertains our best options for next steps: *What should I do? Was that something I should approach, or avoid? Will it satisfy a goal, drive or a need of mine?* Whether we wish to accept this reality, we exist in an almost perpetual state of emotional arousal and decision-making based on feelings.

When we think, remember, imagine and mentally rehearse interpersonal encounters, emotions dominate the contents and determine the directions that our thoughts will take. At any given moment, what we pay attention to and what we choose to ignore are driven by emotions. Memory gives us a personal past that is only made possible as a consequence of what we paid attention to while we were *in the present*, which was governed not by the events themselves but by how those events were linked to our emotional states at the time.

Imagine an "emotional number line," with zero at its center, +10 to the farthest point right and -10 to the farthest point left. Our strongest memories are formed at either extreme of the emotional continuum. The representative neural pathways there are flooded with glutamate—the most common neurotransmitter—signaling the brain to encode the event with a *We'd better remember this!* marker. The closer we approach zero on the continuum, though, the more emotionally indifferent we become, relegating that experience to the mental trash heap ("trivia"), where it is promptly forgotten.

In schools, we often are confronted with the mutually exclusive binary choice of being either intellectual or emotional, but seldom is their interdependence acknowledged. All memories are not creating equal; students learn what they care about and are most interested in personally relevant matters. The most difficult things to remember are those that have no personal-emotional importance to us. Those with a deep emotional connection have greater longevity, are easiest to retrieve from long-term memory and enjoy the greatest degree of durability; nothing short of acute regional brain damage will dislodge them from permanent memory.

Learning commonly refers to immediate changes to the brain that come by way of experience, but all learning begins with emotions and relies on the same dynamic interplay between emotions and cognition.

WHAT ABOUT EMOTIONS?

Human emotions are complex and highly developed, but simultaneously primitive and somewhat unrefined, influenced by both primary and secondary needs. Emotions can serve as powerful motivators, learning catalysts and healthy memory boosters, just as easily as they can be disruptive forces in our lives. Most mental health disorders are grounded in problems with emotions or attention, and frequently both.

Since emotions are subjective experiences, educators and the scientific community in the past have tended to dismiss them because they cannot be measured, controlled or calibrated. Fortunately, neuroscientists and educators are turning to one another to answer the same questions concerning the impact of emotions on learning.

When we evaluate elements in our surroundings, we engage the emotions, which provoke an instantaneous bodily (visceral) response to each element, taking note of those features deemed of greatest emotional importance. Following our cognitive-emotional assessment, we might smile, become fearful or angry. We might tenderly approach a person or an object almost instantaneously. Residing in between each of the basic emotions, we find a great number of *other* human emotions. Our feelings might best be viewed along the following seven continua of emotional ranges:

1. Love—Indifference—Hate
2. Ecstasy—Sadness—Remorse
3. Excitement—Serenity—Boredom
4. Trust—Apprehension—Terror
5. Pride —Acceptance—Shame
6. Pleasure—Relief—Pain
7. Admiration—Disapproval—Loathing

Humans are endowed with a long list of emotions, each with a short list of associated conditions under which the emotion is expressed. The human face has 44 muscles which can produce over 10,000 different facial expressions, many of which are universal and easily deciphered, revealing our underlying emotions and intentions. Some emotional experiences involve the entire body (laughter, sobbing, excitement, etc.), while others are more subtle (acceptance, hope, optimism, admiration, etc.), where the internal feeling remains largely concealed. Over the course of evolution, we have developed distinct emotions for different occasions as being the most appropriate responses, as opposed to automatic reactions witnessed in animals with a less-developed cortex and a relatively small catalog of emotional responses, regardless of the environmental trigger.

Psychologist Paul Ekman, one of the most influential psychologists of the 20th century, discovered that each human emotion comes with an almost universally identifiable facial expression, regardless of culture, ethnicity or experience. More interestingly, Ekman and Dr. Maureen O'Sullivan uncovered the phenomenon of human *microexpressions*, which reveal our true underlying emotions and are only detectable with the assistance of a high-speed camera. Sequenced images capture facial reactions that are sliced into fractions of a second, exposing the microseconds of sneers, snarls, smiles, etc., which occur so quickly and whose duration is so brief that they cannot be detected by the naked eye in real time but become photographically clear upon review. Facial cues can subconsciously activate the orbitofrontal cortex in such a manner that we have "a bad feeling about Mary," but we're not certain as to precisely *why*.

When we are cold, we shiver. Yet shivering would be an unsuitable behavioral reaction to experiencing a heat wave, where we should perspire instead, which is a specific response to a specific environmental change that our bodies detect.

Strangely, the human body-brain system has evolved over the millennia without expanding our response repertoire to make distinctions between a physical threat, an intellectual threat, a psychological threat, a social threat or an emotional threat (a challenge to our precious egos). While each psychological condition may differ, our *physiological* defenses are nearly identical, due to a mysteriously limited biological repertoire for an "advanced" organism.

With our first glance at the trench-coated stranger passing our classroom door, our limbic system—interconnected anatomical structures nearly encircling the brain stem—orchestrates a "startle response," led by the amygdala. This can occur so spontaneously that the body is responding (sweating and/or running) before the brain is consciously aware of the threatening stimulus—occasionally generating an irrational false alarm, under the "better safe than sorry" principle. Cortical processing in the more sophisticated regions of the brain has to play catch-up in its appraisal of the precise type of threat, the degree of threat and our history with that type of threat, based on incoming information now being evaluated by the slower-processing cerebral cortex.

There are multiple attention-getting elements in the environment, all simultaneously competing for the limited amount of attentional resources in the brain. Like a motorist permitted to drive in the fast lane of a freeway, fear is a high-priority customer and the highest-ranking traveler on the neural superhighway, with unrivaled authority to sprint past reason and other more thoughtful responses at any time. Human survival did not allow our ancestors the luxury of weighing each environmental variable cautiously prior to taking action. Eons later, in contemporary humans, our first reaction is still to freeze and (assuming that time permits) scrutinize the situation, during which time we can plan our next move, which may be to flee or, if we absolutely must, to fight. Physiological changes to our body rise to promote peak performance levels, preparing us for the fastest getaway or the best defense we can muster. When these systems work collectively and effectively to ward off danger, we call that an *adaptive response*.

Fear often prompts the "freeze, flight, fight, and fright" repertoire of reactions, typically in that order. In addition to the immediate release of stress-related hormones and neurotransmitters, once a threat has been registered, all nonessential systems and the body's "long-term building projects" (growth, T-cell production, ovulation, sperm-cell count, etc.) reduce their operations significantly or shut down completely. Women who worry about their prospective pregnancy or their subsequent medical treatments (and their exorbitant costs) are less likely to become pregnant in the first place.

It is under these conditions that the hypothalamus triggers the pituitary gland and the nervous system to prepare the major organ systems for quick action, assault, and/or a possible shutdown (hopefully, only temporarily). The amygdala signals an "all systems alert," triggering the anterior cingulate and the hypothalamus to turn on the autonomic nervous system and to prepare the motor system, the bodily functions and vital organs to anticipate adjustments.

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Motivation & Perceived Rewards

PERCEIVED REWARDS ↓ / MOTIVATION →	HIGH	LOW
HIGH	High pursuit of achievement	Reward not valued (An easy "A"—the reward is too easily attained. Why?)
LITTLE/ NONE	Self-satisfaction (a tangible reward is unnecessary or distracting)	No motivation, and no known reward = No effort

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The pituitary gland produces adrenocorticotropin and thyrotropin, activating the adrenal system. The heart muscles contract, causing heart rate and blood pressure to rise quickly, sending "fuel" to the body. The blood vessels constrict, promoting sweating. Hairs stand on end. The spleen contracts and begins the quick production of white blood cells and platelets, to prevent excessive blood loss in the event of a physical injury. Blood vessels in the stomach, the gastrointestinal tract and the kidneys constrict to divert blood to the large muscle groups. The digestive system shuts itself off and the bladder and colon get ready to spill their contents, if necessary. Our salivary glands shut down saliva production, prompting "cotton mouth."

Recall and rational thinking are compromised as the carotid artery reduces cerebral blood flow in order to send more blood to the muscles. The adrenal medulla flushes the bloodstream with adrenaline and noradrenaline, which increase blood sugar and constrict the blood vessels. Pupils in the eyes dilate, sharpening our visual acuity and sending more information to the visual thalamus. Bronchioles in our lungs dilate to increase oxygen intake. Glycogen is broken down in the liver to increase the availability of instant energy. Finally, the hippocampus stores this event and our response to it as a permanent memory to be used in the future. Regrettably, these threat-response processes do not reverse themselves on command. The changes to body chemistry do not dissipate quickly, making it difficult for us to settle down after an emotionally upsetting event.

Some body systems shut off for emergencies, while others turn on. Once the threat has subsided, we return to a state of homeostasis, the tendency toward a relatively stable equilibrium between interdependent physiological processes. Frequently, the only way to resume homeostatic balance is for us to separate ourselves from the associated source of danger.

With extended periods of stress, the body-brain systems establish a new baseline for operating, through the process of *allostasis*; however, when the threat-response systems do not shut down occasionally for rest and repair, long-term damage can occur to both the body and brain systems—for example, post-traumatic stress disorder (PTSD).

Negative emotions in the classroom or at home are incompatible with student learning and achievement. The stress hormones and neurotransmitters required for fight-or-flight response characteristically prepare the body-brain for *escape* rather than for learning. Parents who believe they are helping their child with homework but who spend the vast majority of this time frustrated, angry and shouting instead may notice that memory and content-learning take considerably longer, if they occur at all. To be truly helpful, parents should take the child for a walk, during which time the target concept can be explored and visualized, with the parent filling in the conceptual blank spaces for the young learner.

When a teacher or parent uses aggressive body language coupled with a raised voice, children shift their attention away from the *learn this quickly* intention to Mother Nature's imperative to *leave quickly, you are in danger!* For a child or an adult, being trapped by a seemingly inescapable threat takes a toll on learning, and, eventually, toxic stress impacts one's physical health. Deep breathing, exercise, walking and yoga can serve as anxiety-reducing strategies that can bring us back from the emotional extremes (either 10 on the *emotional number line*). An "emotional hijacking" (a phrase coined by Daniel Goleman in his best-selling book, *Emotional Intelligence*) of the brain takes place in milliseconds. Once it subsides, learning is again possible, but not while the emotional takeover is underway.

It is no wonder that when parents and teachers resign from "helping" in frustration, minutes later, the child jumps up, joyfully shouting, "I got it!" Reducing the tension was critical to any learning taking place. Unfortunately, the adult thinks that he or she was a light along the path to learning, but they were more accurately an obstacle. An upset parent or teacher should extricate themselves from that highly emotional situation completely until he or she can get a better handle on their own emotional instability. Learning is never enhanced by increasing the level of fear for learners.

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There is truly a joy to long-term learning, as a child experiences the emotional fulfillment derived from achievement and public recognition for his or her academic successes. When students ask, "Can we do today what we did yesterday?" they are telling us that "Yesterday, you weren't just *teaching* me, you were *reaching* me in an emotionally gratifying way that I would hope to experience again today." When students are in what psychologist Mihaly Csikszentmihalyi calls *flow*, they become so engrossed in learning and discovery that they tend to forget about the passage of time. Emotional engagement is one of the essential keys to cognition.

In an interview with Shannon Brownlee for *U.S. News & World Report* in 1996 ("The Biology of Soul Murder"), Baylor College of Medicine's Dr. Bruce D. Perry states, "Children who are aroused [from fear] can't take in cognitive information. They're too busy watching the teacher for threatening gestures, and not listening to what she's saying." "Such behavior makes sense," writes Brownlee, "given the constant threats in the child's world. His brain has become exquisitely tuned to emotional and physical cues from other people. At the same time, he may be failing to develop problem-solving and language skills." The child's primary goal becomes to extricate himself from the stressful conditions, not to learn content information. In such children, Perry found that the cerebral cortex is approximately 20% smaller on average than in children of comparable age and size.

Not only will the growth of an individual's brain be reduced under stressful conditions, but the critical operations of his immune system, the body's otherwise highly effective internal pharmacy, also shuts down. Prolonged stress in Romanian orphans, reported famously in the late 1980s following the collapse of the communist government, caused decreased glucose metabolism, high levels of cortisol and increases in other symptoms of stress, which resulted in decreased functioning of the amygdala, the temporal lobe, the orbital frontal cortex, the orbital gyrus, the prefrontal infralimbic cortex, the lateral temporal cortex, the medial temporal cortex and brainstem.

While shrinkage in cortex may be a predictable expectation, a vastly diminished view of oneself is an unexpected casualty of living under the stress of constant fear, according to Bruce Perry, a child psychiatrist at Children's Hospital and at Baylor College of Medicine. Children from troubled homes and rough neighborhoods were asked, "What do you want to be when you grow up?" Sadly, their answers consistently began with the phrase, "*If* I grow up," rather than "*When* I grow up." For these children, threats of, *I will give you a poor grade at the end of the semester!* have virtually no bearing whatsoever on increasing standardized test scores for the No Child Left Behind Act of 2001 data collection, or for long-term learning. For these children, *tomorrow* is considered a dicey proposition, let alone the end of the semester.

EMOTIONS IN THE CLASSROOM

In his 2002 article, "Emotion, Cognition, and Behavior," published in the journal *Science*, neuroscientist Ray Dolan writes, "An emerging theme is the question of how emotions interact with and influence other domains of cognition, in particular attention, memory, and reasoning." Learning is not a passive process, but instead involves a multitude of other factors impacting either the development of efficient learning skills or maladaptive behaviors that may continue to interfere with learning for a lifetime.

Chief among those factors enhancing learning are the emotions of both the learner and the teacher. In addition to the teacher, other students can help create a positive social context for learning through cooperative and collaborative experiences that develop altruistic values and behaviors. Peer relationships and socialization make important contributions to cognitive development. Learning, friendship and social development are the positive outcomes of working closely together, creating an affirming classroom culture that impacts motivation. Motivation is increased when students are engaged in social problem-solving by working together for a solution rather than operating individually.

When students are thinking more about how poorly they are feeling or why they are sensing fear and discomfort instead of focusing on the prescribed content, learning will seldom take place. All classrooms should operate on the basis of what I call the "S.A.I.^{3}L." principles. Preceding the formal instruction should be:

SAFETY
ACCEPTANCE
INCLUSION, **I**NVOLVEMENT, and **I**NTERACTIONS (the interpersonal/social aspects of learning and memory formation)

Once these requisite neurophysiological preconditions are met, then students are biologically ready to learn:

LEARNING (when students feel their environment is important enough to take risks, they will now began to explore and discover the joys of learning.)

The best ways to enhance learning through the most effective use of emotions in the classroom is by using humor, positive feedback, sincere smiles and high fives, along with the following:

- Begin school with an opening-the-day-together ritual indicating to students that they can leave any personal problems (home-based trauma) behind when they enter this safe learning place where no one will hurt them emotionally or physically.
- Regular shared excitement (celebrations) for in-class learning successes and out-of-school personal achievements.
- No put-downs about anyone's personal appearance or academic/athletic performance.
- Clear expectations and rules applied equally to all.
- Do not reprimand students publicly.
- Get to know your students' lives and interests outside of class.
- Announce to your students that they may invite you to an extracurricular activity of theirs (one event per student per year).
- Allow students to write letters of apology for any misbehavior. They should acknowledge their awareness of why what they did was wrong and create a list of "three *different* behaviors I can choose from next time I find myself in the same circumstances."
- An environment of mutual respect.
- Physical pats on the back (not yellow "smiley face" stickers).
- A grading system that reflects both effort and growth.
- Mentorship relationships for struggling students.
- Recognize positive behaviors more than negative behaviors.
- Never make light of a student's personal plight.
- Make sure everyone feels valued as a contributor to learning in the classroom.
- Only call on students when they have indicated they are ready and willing to answer a question. (Humiliation should never be part of learning.)
- Once a week, have a *here is something exciting to share* time (learned optimism), where students focus on a positive aspect of why they like their homes, their school, a friend, a classmate's talent, etc.
- Call students by their name. ("No sound is sweeter than the sound of one's own name.")

Teaching self-efficacy in school and at home is one of our most fundamental responsibilities as parents and educators. Cultivating the emotional habits of positive self-esteem, self-control, self-regulation, self-motivation, self-management, persistence and the control of impulsivity are required to make self-efficacy a reality for today's students. Those who have not developed confidence in these areas succumb easily to feelings of being academically inadequate and emotionally overwhelmed. In addition to being a risk factor for poor academic performance, low self-esteem is also associated with emotional/psychological imbalances, depression, teen pregnancy and suicide. This may partially explain why some exceptionally intelligent individuals flounder, while a C+ student is incredibly successful in life. Intelligence, ambition, confidence and motivation do not always appear in equal amounts within the same individual. The support systems we erect around them are often the deciding factors in determining success versus failure.

It is often said that "Students don't care what you know until they know that you care." When students are convinced that you truly believe in them, in their strengths and high-performance potential, they strive for a new personal best in a safe environment.

When we set the stage for an emotionally supportive and positive learning environment, we reinforce the vital emotional self-beliefs for academic success. If we hope to instill in students a true passion for learning, we can never overstate the importance of students' emotions, as we develop the next generation of confident learners, ready to be challenged, to explore and invent for a lifetime. ■