

**Neuropedagogy:
Imagining the Learning Brain
as Emotive Mind**

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Introduction

For too many decades, through a diaspora of discourses and innumerable voices, we have tried to better mankind through improved curriculum. When the news reports with alarming regularity the murders of children by children, we cannot complacently assert that we have made notable progress. Perhaps for too long we have based our efforts on the wrong concept: the wrong concept of the learning, developing brain. Recent years have seen an increased interest in the role of emotions in many disciplines, but specifically in the field of neuroscience. Neuroscientists, such as Antonio Damasio and Joseph Ledoux, have determined that emotions have a cognitive dimension and are therefore not contrary to, but necessary for rational thought. Neuropsychologists, most notably Daniel Goleman, have explored the psychological and physiological mechanisms associated with emotions and feelings. Goleman sees mankind in crisis and elucidates the need for educators to address the emotional mind.

Education, however, has been reluctant to apply neuroscientific findings regarding emotion. Although the importance of emotion has been acknowledged recently in some educational literature and discourse, its role remains limited and undertheorized. Discourse in the arena of emotions has been limited to the role of teacher emotions related to the politics of educational reform and to teacher-student interactions. Feminists have politicized emotions in their battle to overcome the binary notion of emotional versus intellectual rigor. Some educators have proposed implications for pedagogy based on brain-based research, but little research has been conducted to ascertain specific applications of how emotion functions, perhaps because educational theorists have not ventured into the arena of neuropedagogy and there is distinct lack of discourse concerning its status and merit. The diaspora of curriculum theory has not elicited

substantive progress in pedagogical practice to take us much beyond the non-emotive Cartesian “animal machine...and Kantian angel” (DeSousa, 1980, p 135). Perhaps it is time for a dramatic paradigm shift.

Neuroscience: Emotions as neurological brain function

Neuroscience is a burgeoning field which is changing the way the world views emotions: not as something to be controlled and suppressed as the ancient Greeks and many of our mothers taught, but as the gateway to learning and memory. Ninety percent of all the neuroscientists who have ever lived are alive today (Wolfe & Brandt, 1998, p. 8). In large part due to improved scientific method, such as Positron Emission Tomography (PET), which depicts energy consumption of various parts of the brain; the perfecting of Multi-Resonance Imaging (MRI), functional MRI, and Nuclear Magnetic-Resonance Imaging (NMRI) which provide cross-sectional images of soft tissue, knowledge of how the brain functions has increased dramatically in the last decade (Jensen, 1998, p. 2). Neuroscientists have rejected the idea that specific parts of the brain perform designated singular tasks and now assert that brain parts are highly integrated, and while specific parts such as the amygdala function as the hub for certain tasks, they do not perform these tasks alone, but serve to orchestrate and coordinate neuronal activity.

While many neuroscientists have contributed to the canon of brain function, I will focus on Antonio Damasio and Joseph Ledoux as two of the leaders in this field of study. Damasio is the Head of the Department of Neurobiology at the University of Iowa College of Medicine and adjunct professor at the Salk Institute for Biological Studies in La Jolla, California. He is internationally recognized for his research on the neurology of memory, vision, and language, as well as his studies and work with brain damaged

patients, especially his contribution to the defining of Alzheimer's disease. Ledoux is the Henry and Lucy Moses Professor of Science in the Center for Neural Science at New York University. I have chosen Damasio and Ledoux because they are not only widely cited, but also are among the few neuroscientists who have combined reflective, neurobiological research with behaviour theory to propose a new theory of emotion.

Damasio's concept of mind and emotion

Antonio Damasio's theory of emotion has evolved from his first book, *Descartes' Error: Emotion, Reason and the Human Brain* (1994), which proposes how feelings are enmeshed in the cogitations of the brain and the conditions of the body. In his second book, *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (1999), Damasio delves into the role of emotion; he attempts to connect the neurology of emotion to the neurology of consciousness and extends this to the engendering of a sense of self. His latest book, *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (2003), updates his view of emotions and feelings based on recent neuroscientific findings: emotions and related reactions are associated with the body; feelings are associated with the mind. Damasio commits himself to elucidating the neurobiology of emotions and feelings as his contribution to the mind/ body problem, which he states is "central to the understanding of who we are" (2003, p. 7). I cannot purport to present in any adequate way the multiplicity of concepts represented in his books and other writings, but to simply summarize his ideas as I perceive them that are pertinent to my argument that neuroscience has something to offer to educational theorists and philosophers, and concomitantly, to educator practitioners.

Damasio is an eclectic neurologist who considers research from a variety of perspectives when formulating his own proposals about the rational mind. He argues that

in order to understand the human mind, we must “move from the nonphysical cogitum to the realm of biological tissue” (Damasio, 1999, p. 252), and relate this knowledge of the brain to the whole person, which exists in the context of both the physical and social environment. The body, according to Damasio (1994), and specifically the brain, are “the indispensable frame of reference for the neural processes that we experience as the mind” (p. xvi). Damasio states that the mind and body are inseparable and integrated via mutually interactive biochemical and neural components, such as the endocrine, immune, and autonomic neural constituents, which produce chemical and electrical transmitters. These neurotransmitters circulate through the humoral and neural pathways of the body and brain. Damasio considers these neural and biochemical processes and circuits which signify brain function in theorizing that emotion, feelings, and biological regulation are integral parts of human reason.

The Theory of Emotion as Process

Both Dewey and Damasio describe emotion as a process. In his *Theory of Emotion 1: Emotional Attitudes* (TOE1, 1894) and *Theory of Emotion 2: The Significance of Emotion* (TOE2, 1895), Dewey proposes that emotional experience has two phases: first, “it is a disposition, a mode of conduct, a way of behaving” (TOE2, p. 3) and secondly, it “always has its ‘object’ or intellectual content” (TOE2, p. 4). Here Dewey espouses that emotion has a physical expression and an intellectual component. Further, Dewey defines the experience of emotion as follows: a stimulus provokes the two “phases,” a physical reaction or instinctive reaction, and cognition in relation to the stimulus. These phases, he argues, are parallel and simultaneous and create what he calls an affect or feeling, which can be defined as a conscious emotional reaction to the original stimulus (TOE2, p. 9). Damasio (2000) defines emotions as “specific and

consistent collections of physiological responses triggered by certain brain systems when the organism represents certain objects or situations” (p. 15). He states that stimulus is received by the brain where it is assessed. Messages are then sent via humoral and neural pathways to the body and other parts of the brain. The body undergoes somatosensory changes, such as flushing of the skin and acceleration of the heart rate. Simultaneously, messages are sent to many other parts of the brain where the stimulus is analyzed and further messages are sent to the body. By way of explanation, let me give my version of Dewey’s bear analogy (TOE2, pp. 4,5).

Picture a person walking in the forest alone. He turns a corner in the path and suddenly sees a large bear. The sensory input sends the brain the image of the bear. The brain sends signals using neurotransmitters telling the body to react: the heart speeds up, the muscles tighten, blood rushes to certain parts of the body. Simultaneously, the image of the bear is sent to other parts of the brain for analysis. This analysis accesses stored knowledge and memories. These analyzing regions of the brain continue to process further information to the brain hub which then sends another message to tell the body to relax. The heart slows, the muscles relax, the blood flow returns to normal. Why? The bear is a victim of taxidermy. The person breaks into laughter and tears run down his face. This person has experienced both emotion and feeling.

Distinguishing Emotion from Feeling

Damasio makes a clear distinction between emotions and feelings. Damasio says that, unlike emotions, feelings are not instinctive; they are conscious and discriminatory because they are based on memory, knowledge, and the sense of the autobiographical self (1999, p.17; 2003. p. 271). The basic functions of emotions are preset: they are “bioregulatory devices which are instinctive and autonomic” (Damasio, 2000, p. 15).

Damasio denotes these primary emotions as fear, happiness, sadness, anger, surprise, and disgust (1999, p. 50) and asserts that they are universal emotions because of their appearance in primates and early appearance in human development (1994, p. 85). These primary emotions are “curious adaptations that are part and parcel of the machinery with which organisms regulate survival” (Damasio, 1999, p. 54) and originate in the limbic system. All sensory input from the body is sent to the amygdala and the cortex via the thalamus. Physiologically speaking, the amygdala, two almond-sized structures in the limbic system, act as emotional filters for sensory information, especially fear. The amygdala is the key player, in that it both sends and receives information from many other parts of the brain (1994, p. 133; 1999, p. 64; 2003, p. 90). If the amygdala assesses this input as having high emotional content, it prioritizes the input and immediately sends neurotransmitters which signal various parts of the brain, (such as the hypothalamus), and body, (such as the heart), to act; such is the case in the analogy when the person initially sees the bear. Because the basal ganglia and neocortex take longer than the amygdala to process information, it is possible for the amygdala, in effect, to short-circuit the brain. Meanwhile, the same sensory information is sent to other parts of the brain, such as the basal ganglia and the neocortex, where knowledge and memory are accessed and included in the assessment of sensory input. This combination of input and assessment reaches a level of consciousness and the emotion then becomes a feeling, or what he calls the feeling of emotion, which he defines as “the representation of that transient change in organism state in terms of neural patterns and ensuing images” (Damasio, 1999, p. 282). In the analogy, this occurred when the person became aware that s/he was fearful of a stuffed bear.

Damasio's Somatic Marker Theory

According to Damasio, we are born with the neural mechanisms required to generate body or somatic states, such as fear, in response to certain sensory stimuli. When fear or disgust, for example, is generated, certain bodily responses correspond to each of those emotions. These responses are largely universal: for example, babies respond to the fear caused by a sudden, loud, unusual noise by tensing muscles, accelerating heart rate, and crying. As time passes, however, while bodily reactions or somatic states that correspond to such emotions as fear remain the same, the machinery of emotions develops more sophisticated biases through the autobiographical self's collection of memories. For example, if that child lives in a war zone where loud noises are frequent and normal, the child will come to not react as significantly or fearfully to loud noises. Similarly, the person in the analogy will remember that not all bears are dangerous.

It is important to note that body or somatic states can be positive or negative. Negative body states slow down the processing of images and limit the diversity of images which can be processed, thus limiting the efficiency of reasoning, but allowing the body to focus attention on the object causing the negative emotion. Positive body states enhance rapid generation of diverse images, and reasoning is speeded up, but not necessarily efficient (Damasio, 2003, p. 147). Happiness, for example, also has specific body states which mark its occurrence, so specific that, Damasio's experiments delineate clearly the difference between a genuine or emotional smile and a contrived or feeling smile (1994, pp. 140-141). His study shows that not only are different neural pathways activated, but also different body states are enacted, including the use of different facial muscles. These neural pathways that serve specific emotions, Damasio (2003) refers to as neural maps; and the bodily responses that accompany specific emotions, he refers to as

body maps (pp. 111-112). This corresponds with William James description of “standard emotions” such as fear and anger, where he argues that feelings are based on a perception of bodily states (1967, p.13).

According to Damasio’s theory, objects perceived by the senses are assessed for emotional content and marked. This marking may be based on prior neural maps and/or body maps associated with the object, or based on general instinctive associations. Thus, each object is marked or signaled as either positive or negative (Damasio, 2003, p. 148). These somatic markers or emotional signals do not make decisions, but guide decisions by helping to focus attention on certain aspects of the environment and thus enhance the quality of reasoning and, theoretically, the appropriateness of our responses (Damasio, 2003, p 147).

Damasio paints a picture of an integrated body and mind, linked together by the emotion and feeling functions of the brain. Emotions, which are unconscious, create body states; but feelings, which are conscious, most often arise from neural maps, which are based on repeated body states (Damasio, 2003, p. 112). Feelings then, according to Damasio, are cognitive, since they rely on activities and functions within the brain. He has hypothesized how emotion and feeling colour the working of the brain, influencing every function so that cognition can no longer be examined without its cohort, emotion. Although he has not linked his findings to praxis, Damasio has constructed a palette of colours with which educational theorists can paint a scene to illustrate how we can approach learning from a new discourse.

Joseph Ledoux’s Emotional Brain

Joseph Ledoux is a neurologist who has been studying the brain mechanisms of emotion since the 1970’s (1996, p. 9) and is credited as being the first to discover the

significance of the amygdala (Goleman, 1995, p. 15). Ledoux's book, *The Emotional Brain: The Mysterious Underpinnings of Emotional Life* (1996) is not about the marriage of the psychology of emotion to brain function, but is written rather to show "how studies of brain function allow us to understand emotion as a psychological process in new ways" (p. 23). Like Damasio, he argues that the brain systems that generate emotions are highly conserved through many levels of evolution (Goleman, 1996, p.17), and that emotions and what he calls emotional feelings are different. Damasio and Ledoux agree that emotions cannot be disembodied.

Ledoux set out to examine the brain function of emotion. He examined the intricate functions of the amygdala, which was part of the limbic system long associated with emotions (1996, p. 157). Using chemical tracers, Ledoux (1996) discovered that the amygdala is composed of approximately twelve sub-regions (p. 161). Sensory input from the thalamus to the amygdala first goes to the lateral nucleus, which processes the stimuli and decides to what other regions of the amygdala the results will be distributed. The central nucleus of the amygdala, which receives input from the lateral nucleus, is responsible for activating different emotional responses in the body.

When sensory information enters the brain, the thalamus directs it to the amygdala and simultaneously to the sensory cortex. Like Damasio, Ledoux identifies the two routes of sensory information: Ledoux (1996) calls them the low road, where the amygdala is the primary respondent; and the high road, where the sensory cortex is the primary respondent (pp. 161,165). Ledoux (1996) describes the amygdala as the hub of a wheel, capable of sending output and receiving input from various parts of the brain, including the low level thalamus and the higher level cortex and hippocampus (p. 168-170). Ledoux goes further to explore how sensory input incidents are recorded as

memory. The amygdala, Ledoux asserts, has more neural connections called axons which send information to other parts of the brain than those parts reciprocate, indicating that the amygdala is more a controller than controlled (1996, pp. 284, 285). Ledoux's description of amygdala function is congruent with Damasio's, but more detailed. Ledoux also distinguishes emotion and feeling through the brain functions of unconscious and conscious thought. Emotions, he claims, are subjective and outside conscious awareness. Feelings occur when emotions have coupled with memory and knowledge and become conscious as well as individual. Consciousness, maintains Ledoux, is necessary for feelings to exist, although one may not be conscious of the object eliciting the feeling (Ledoux, 1996, p. 298).

Ledoux also explores the arena of memory as connected to emotion. He distinguishes between unconscious, implicit emotional memory and conscious, explicit memory about an emotional situation. Implicit memory is mediated by the amygdala and explicit memory is mediated by the hippocampal system. Ledoux claims that in order to understand what emotion is and how exactly feelings arise from emotions, "we've got to understand the way the specialized emotion systems operate and determine how their activity gets represented in working memory" (1996, p. 282). Whereas Damasio explains a feeling as a neural map of a body state, Ledoux seeks to explain a feeling as a representation of the activity of specialized emotion systems in the brain "that give rise to consciousness" (1996, p. 282). He specifically examines the activation of amygdala output that converts an occurrence into an emotional experience. Connections from the amygdala to many different cortical areas allow the amygdala to influence attention, perception, and memory in collecting and assessing pertinent information which is relayed back to the amygdala and used to monitor and delay, maintain or change a bodily

reaction (Ledoux, 1996, p. 285,287; 2000, p. 143). What makes these systems function on high alert is the brain's arousal system. Several systems, many of which are located in the brain stem close to the amygdala, create different neurotransmitters, which enhance axon receptors via neural and humoral pathways. These neurotransmitters arouse brain cells to incoming signals. Arousal is important to attention, perception, memory, emotion and problem solving (1996, p. 289). Damage to the amygdala prevents arousal. When the amygdala is involved in arousal, it also activates networks which control behavioural and visceral responses. Certain emotions, such as fear, cause the amygdala to heighten prolonged arousal in several parts of the brain. This is why, after a traumatic event, surmises Ledoux, it is difficult to relax and/or sleep for some time. In contrast to emotional arousal stimuli, there is also novel arousal stimuli, which is not as strong nor prolonged and is activated by systems other than the amygdala (Ledoux, 1996, p. 290). As well as the amygdala sending messages from the brain to the body, the body sends messages back to the brain about the state of the body, which Ledoux acknowledges as Damasio's somatic marker hypothesis and as "gut feelings" (Ledoux, 1996, p. 293), that play a role in decision making processes. Ledoux delineates the neural ingredients of a conscious emotional experience, or feeling as the specialized brain systems that activate, process, and store emotions, the systems that create arousal of the necessary brain parts, and the body feedback. He distinguishes feelings from thoughts by the different brain systems which are active for each one, and contests that feelings "involve many more brain systems than thoughts" (1996, p. 299). Emotions, writes Ledoux, "cause a mobilization and synchronization of the brain's activities" (1996, p. 300) that is functionally dissimilar to thinking which does not have significant emotional content.

Clearly, Ledoux's findings regarding the role of the emotions in brain function have implications for learning and consequently for teaching.

Neuropsychology: Emotion Related to Behaviour

Daniel Goleman is a psychologist who draws on the neurobiology of Damasio, Ledoux, and others to establish the importance of emotion in the day-to-day functioning in our lives. Goleman's proposal of emotional intelligence takes Howard Gardner's personal intelligences to a different level and incorporates recent neuroscientific findings. Gardner admits that his theory focuses "more on metacognition... rather than on the full range of emotional abilities" (quoted in Goleman, 1996, p. 41). Goleman argues that it is emotional intelligence "that makes us more fully human" (1995, p. 45) and that while metacognition is important, self-awareness is critical. Self-awareness he defines as "the sense of an ongoing attention to one's internal states" where "the mind observes and investigates experience itself, including the emotions" (1995, p. 46). Goleman claims, as does Damasio (2003, p. 51,52) and Ledoux (1996, p. 301), that the brain has evolved from the primitive, instinctive, emotional brain based on the parts of the limbic system to a combination of emotional and thinking brain which includes the cortex and the neocortex.

There are two ways of "knowing," says Goleman: one, the rational mind of which we are typically conscious, and the other, the emotional mind, which is primarily unconscious. The emotional mind, the primitive mind in the evolutionary process, primarily involves the limbic system, which includes the hippocampus that registers information and mediates memory, and the amygdala which holds emotional memories that are often unconscious (Goleman, 1995, p. 15) and regulates basic functions and ensures survival. The later evolutionary brain includes the cortex, which refines learning

and stores long-term memory; and the neocortex, which creates, strategizes, problem solves, and is responsible for long term planning. Goleman and Damasio agree that most often these two distinct, yet linked parts of the brain function in homeostatic harmony (Goleman, 1995, p. 28; Damasio, 2003, p. 42).

Theory of Emotional Hijackings

What Goleman focuses on in his book, *Emotional Intelligence: Why It Can Matter More Than IQ* (1996), is the ability of the emotional brain functions to override the rational brain functions in ways that are not always conducive to the user's well-being. These occurrences he calls emotional hijackings, and it is these powerful overrides of the rational functioning brain that Goleman regards as the root of inappropriate, passionate actions.

We have all become overwhelmed by emotion and said or done things we regret. When we ponder these actions after the fact, we often cannot understand how or why it happened; we often label these actions as irrational. On a larger scale, we see such actions in the news: the sweet, quiet boy who slices another's throat in a fit of anger; the group who beats another boy senseless because he is wearing a red jacket. It is Goleman's hope that if we can understand how these emotions occur biologically and relate that knowledge to our behaviour, we can come closer to modifying our reactions to emotionally provocative events.

Goleman theorizes that emotional hijackings occur because of neural connections, proximity, and the function of the amygdala. He points out that the amygdala, which he calls "the emotional sentinel" (1995, p. 17), has the ability to override the neocortex because sensory input, which travels from the brain stem to the thalamus, only need cross a single synapse to reach the amygdala, whereas this same stimuli, which is

simultaneously sent to the cortex and then to the neocortex, must travel a more circuitous route (1995, p. 17,25). In rats, the amygdala has been recorded as responding to stimuli from the thalamus in twelve milliseconds; the neocortex takes twice as long to respond and send processed sensory input information back to the amygdala (Goleman, 1995, p. 20). The amygdala is also in closer proximity and has more direct synaptic links to the body centers, such as the adrenal glands, which control autonomic body functions, such as those used in the fight or flight reaction to fear (Goleman, 1995, p. 20). According to Goleman, this explains the how; he goes further to theorize why emotional hijackings occur.

The amygdala plays the primary role in Goleman's reasoning as to why emotional hijackings occur. In the limbic system, the hippocampus stores memory that Goleman (1995) calls "dry facts"(p. 20); the adjoining amygdala stores the emotions that accompany the facts. The amygdala, according to theory, has the capacity to attach neurotransmitters that mark certain facts with emotional intensity (Goleman, 1995, pp. 20,21). These emotional markers signal the potency of the memory. For this reason, Schindler remembered the girl in the red coat in the ghetto, for that was the moment when he was struck with the horror of what Hitler's eugenics machine was doing (Fogelman, 1994, p. 54). Eva Fogelman, a psychologist, reports in her book, *Conscience and Courage* (1994) that a common phenomena among rescuers of Jews during the Holocaust is that they had vivid memories of heightened awareness of sight, sound, and smell related to the moments of epiphany when they became committed to saving Jews. Goleman (1995) states that the stronger the intensity of amygdala arousal, the stronger the memory imprint (p. 21). This would ensure that a primitive homo sapien who had a near death encounter with a large animal would be on high alert when he saw another

such animal, even if there was only a resemblance. While the amygdala's provocation is fast, it is not always accurate. The amygdala's method of comparing new stimuli to old memory is associative (Goleman, 1996, p. 21) and in its primitive role, this was essential to survival. Perhaps survival governs the fact that the amygdala is more fully formed at birth than other parts of the brain, especially the cortex and neocortex.

Emotional Literacy

Goleman wishes to free us from the slavery of emotional hijackings. Through emotional literacy, he hopes to achieve balance between the rational and emotional functions of the brain, not emotional suppression (1995, p. 56). In light of neurological research, Goleman sees the inefficacy of seeking to control the emotions by use of the rational mind; rather he proposes a way to mediate the emotions or to promote meta emotion in order to improve the lot of mankind. He claims that we have little or no control over emotional hijackings whose origins are unconscious, but that we do have control over how long the emotions can last and their magnitude (1995, p.57). Citing the research of Jerome Kagan, an eminent developmental psychologist at Harvard University, he argues that children are to some degree born with a certain threshold of excitation in the amygdala, (1995, p. 217-218). However, Goleman believes that emotional capacities are not determinate. He believes that we can mold the emotional circuitry of children and adolescents in order to shape lifelong emotional propensities (1995, p. 226). While the amygdala matures at approximately eight months, the sensory areas of the brain mature during early childhood, and the limbic system matures by puberty. Specifically, the frontal lobes, which are important in regulating limbic impulses and are acknowledged as the "seat of emotional control, understanding and artful response"(Goleman, 1995, p. 226) continue developing until between ages sixteen and eighteen. As a result, emotional

habits established and repeated until age eighteen can form and reinforce synaptic neural pathways that have longitudinal perseverance (Goleman, 1996, pp. 80-82). While emotional responses to stimuli can be altered in adults, the process is arduous (Goleman, 1995, p. 227; Ledoux, 1996, p. 265).

Schooling the Emotions

While Goleman states that schooling the emotions should begin in infancy, it is never too late to begin the task of improving emotional literacy. He claims that children need “emotional coaching,” which includes acknowledging and responding to their emotions in non-judgmental ways, seeking to uncover and explain the origins and effects of emotions, presenting and modeling empathy and problem solving in emotionally charged situations, teaching acceptable alternatives to extreme emotions, and guiding children in delaying gratification and impulsivity (Goleman, 1995, pp. 226-227).

Goleman cites psychologist John Gottman’s research, which showed that when parents performed this emotional coaching well, the vagal activity which kept the amygdala highly active in emotional predicaments was significantly reduced (1995, p. 227).

Goleman (1995) believes that society’s trend toward fewer parent-child positive interactions, due in part to more single parent families and increased pressure for both parents to work outside the home, is depriving too many children of parental guidance in “emotional competences and moral character” (p. 234). Hence, Goleman agrees with Howard Gardner that “we need to train children in the personal intelligences in school” (quoted in Goleman, 1995, p. 42). While Goleman espouses educational literacy courses in schools and therapy for adults, he focuses on the education of children in *Emotional Intelligence: Why It Can Matter More Than IQ*. As exemplars, he uses the Self-Science Curriculum at the Nueva School, a private elementary school operating for more than

twenty years in San Francisco, California, and the Life Skills course at the Augusta Louis Troup Middle School, an inner city school in New Haven, Connecticut. In both schools the children take a course in emotional literacy and all teachers are trained to apply its principles in the everyday functioning of the schools. Goleman, who visited both schools, advocates strategies such as courses in emotional competences, but warns that the goal is not to create a new class, but to teach contextual lessons in emotional education, “to blend lessons on feelings and relationships with other topics already taught” (1996, p. 271). While I agree with Goleman’s advocacy of teaching children how to competently recognize and channel their emotions, I would argue that we must go a step further, and teach children how the brain works and enable them to be meta-emotive.

Current Educational Arena

While many educators have critiqued the hegemonic force of an epistemology that privileges rationality, few have engaged in discourse that gives emotion an ontological place in learning. Despite the growing canon of brain-based research and its concurrent application to human behaviour by psychologists, educators have shown a reluctance to address its relevance in a significant way. Educational literature addressing the role of emotion has by and large centered on the role of teacher emotion related to change or reform, the study of emotions in teacher/student interactions, the feminist perspective of emotions, emotion as an ethic of care, and recently, teaching as emotive activity. I will now address each of these discourses briefly, citing the work that I found to be representative.

The Role of Emotion in School Reform

Michael Fullan places emotions in the human relations of management discourse. He acknowledges that technical overhauls, political pressure, and moral exhortation have

not proven successful perpetrators of educational reform (Fullan, 1997, p. 217). He advocates looking to Goleman's emotional intelligences, specifically hope and empathy, as the key to positive change. Fullan claims that an initiator of change "who combines hope and empathy...has a much greater chance for breakthrough" (Fullan, 1997, p. 223). Emotionally effective leaders, he asserts, recognize that "complexity and diversity is endemic in postmodern society" and provide forums for both dissent and assent. These leaders "know that emotion is energy" (Fullan, 1997, 223) and work on establishing relationships among staff which reconcile the reasons for resistance with the need for change. He refers to Damasio's evidence that emotions are critical to making decisions (Damasio, 2003, p. 145) because they intuit choices (Fullan, 1997, p. 220). Based on Damasio's research, Fullan (1997) asserts that the combination of emotion and intellect is crucial to making effective decisions (p. 220). Fullan (2003) advises that leaders with strong emotional intelligence are needed to create conditions where teachers will be co-creators of much needed "large-scale, sustainable reform" (p. 5). Fullan argues that educational leaders must use emotional intelligence to deal with the negative emotions in schools which hinder teachers' hope that they can affect change and make a difference in the world in which they live.

Andy Hargreaves (2000) regards emotions as a field of inquiry (p. 813). He addresses the emotions of teaching and educational change, the emotional nature of teachers' interactions with students, parents, principals and their peers, and how emotional expression varies according to gender, ethnic identity, and life/career stage. Interestingly, he laments "the disturbing neglect of the emotional dimension in the increasingly rationalized world of educational reform," but also warns against "the risks of embracing emotion in indulgent and romanticized ways that might divert us from

critical engagement with this process of rationalization” (Hargreaves, 2000, p. 811), or what he refers to as postemotionalism. While he recognizes Goleman’s claim that emotion, cognition and action are “integrally connected” (Hargreaves, 2000, p. 812), he clearly depicts emotion as a manipulative tool useful in enhancing the rational process of school reform. While he cites Damasio in stating that judgment is “enhanced by feeling and passion,” he uses the words emotion, feeling, and passion interchangeably and claims that cognition can “help us guide and moderate our emotions,” (Hargreaves, 2000, p. 812), which places him, in my mind, at least on the periphery of the rationalized world he claims to disdain. He conceives emotions as binary in nature, either good or bad, and teachers’ practice as exciting or dull, risk-taking or cynical (Hargreaves, 2000, p. 812). While he claims to have taken a social-constructivist stance, his contextualized view of emotion as a relational construct between people ignores the “systematic understanding of how teachers’ emotions are shaped” (Hargreaves, 2000, p. 813) and manifested in their relationships.

Hargreaves (2000) credits Goleman with identifying the basic emotional competences and concedes that they are essential to being an effective educator, but accuses Goleman of reducing emotions to a set of skills and criticizes him for not acknowledging culturally different forms of emotionality nor its political embeddedness (p. 814). However, Goleman’s work does not reduce emotional competences to a set of skills; his competences are not meant to be a definitive list, but merely a collection of emotional abilities that have been identified by researchers as having significance in emotional proficiency (Goleman, 1995, p. 259). Hargreaves is correct in his criticism that Goleman largely neglects the cultural aspect of emotions, with the exception of his cautions to be aware of different cultural norms in business (Goleman, Boyatzis &

McKee, 2002, pp. 50,64). However, Goleman's focus is on the emotional essence of the salient individual as part of the polis; and this, by implication, concerns the entirety of what makes us human, including ethnicity. It is doubtful that Goleman would disagree with Hargreaves' claims that "managing one's moods is quite different depending on whether the person concerned is, say Chilean or Germanic Swiss" (2000, p. 814).

However, while the level of management and display of emotions might be determined by accepted ethnic standards of the polis, I would argue that the brain function for this management would be the same no matter what the ethnicity of the individual. My regret concerning Goleman is his apparent abandonment of the humanity of emotions for the power of emotions, since he has turned his focus from improving the emotional plight of mankind in *Emotional Intelligence: Why It Can Matter More Than IQ* (1995) to improving the skills of CEO's in *Working With Emotional Intelligence* (1998) and *Primal Leadership: Realizing the Power of Emotional Intelligence* (2002), which he co-authored.

The Role of Emotion in Student/Teacher Interactions

Lyle Yorks and Elizabeth Kasl (2002) recognize the importance of affect in adult learning and acknowledge that its educational role remains undertheorized (p. 176). They argue that John Dewey's pragmatism has deflected attention from theorizing about the role of affect in education and posit John Heron's phenomenological theory of experience as "an alternate perspective" (York and Kasl, 2002, p. 176). From Heron's theory, *Modes of Psyche and Ways of Knowing*, Yorks and Kasl propose three factors that promise potential value for a theory connecting affect to learning: (1) the nature of experience is felt encounter, (2) the idea that multiple ways of knowing, each with its own canon of validity, must be recognized, and (3) a theoretical distinction between feeling and emotion. They suggest replacing the cognitively biased term *habits of mind*

with *habits of being*, which is more wholistic and encompasses the affective aspect of learning-within-relationship that they espouse as the base for learning (Yorks and Kasl, 2000, p. 185). Learning-within-relationship regards learning as both an intrapersonal and interpersonal activity which acknowledges multiple ways of knowing (affective, imaginal, conceptual, and practical) and promotes nurturing “a field of empathetic connection,” a *habit of being* (Yorks and Kasl, 2002, p. 185).

Heron’s distinction between emotion and feeling clearly exhibits his concept of affect. He defines emotion as “the intense, localized affect that arises from the fulfillment or the frustration of individual needs and interests” and feeling as “the capacity of the psyche to participate in wider unities of being” (cited in Yorks and Kasl, 2002, p. 186). These definitions reflect York and Kasl’s phenomenological view that the affective domain is merely one of the four domains of knowing and that they are concerned with only the exhibited expressions of emotion related to the experiences under scrutiny.

The Role of Emotion as Feminist Discourse

Megan Boler (1997) acknowledges that emotions and emotional dynamics of groups have a monumental impact on learning and classroom environment, and laments the “phenomenon of the ignorance of emotion” (p. 203). She blames the lack of discourse relating the role of emotions to the political binary opposites purported by traditional Western thought that not only regards reason as superior to emotion, but maligns and neglects emotion as an area of epistemological inquiry (Boler, 1997, p. 203). Boler (1998) seeks to affirm the importance of “the feminist politics of emotion” and denounces what she calls “the misogynistic backlash” (p. 2) against feminist theory and practice which is grounded in the recognition of the important role of emotions. While there has been a recent shift to acknowledge emotional intelligence, Boler claims it has

been adopted in an ad hoc manner in the hopes of a quick fix to social problems such as violence and teenage pregnancy (1997, p. 204). Boler (1997) cautions that underlying philosophies, namely “models of morality and epistemology, and their defining discourses” (p. 204) need to be carefully examined and elucidated.

Boler classifies and dismisses discourses other than the politics of emotion as misplaced and misguided (1997). She negates rational discourses as attempting to categorize, codify, and universalize emotion. She argues that rational discourse legitimizes emotions only when used in argument or debate. Neither does Boler credit philosophy as presenting a viable discourse on emotion; in fact, she states that “philosophy is par excellence the discourse of rationality on emotion” (1997, p. 208).

What she refers to as pathological discourses include biology, neuroscience, and psychology. According to Boler, the pathological sciences assume a false norm of emotional homeostasis, view emotions as “weather fronts over which we have no control” (1997, p. 205), and reinforce what she calls “normalizing representations of women’s tearfulness and men’s aggressiveness” (1997, p. 207). Damasio, Ledoux, and Goleman recognize that basic emotions cannot be stopped from occurring, but our reactions which correspond to them can be regulated (2003, pp. 47,49; 1996, p. 175; 1995, p. 57). Also, all three would argue that feelings, which are secondary emotions and involve cognitive parts of the brain such as the cortex, can be controlled (Damasio, 2003, p. 52, 62-63; Ledoux, 1996, p. 295; Goleman, 1995, pp. 226-227).

According to Boler, artistic and religious traditions fall under the romantic discourse, which seeks to channel emotions into culturally appropriate media and rituals. Her view of artistic emotion would reflect Aristotle’s belief that music and theatre habituate the emotional being within an acceptable social context, enabling people to

experience emotions vicariously through music and theatre and thereby purge themselves of undesirable or extreme emotions (cited in Rorty, 1998, p. 61).

What Boler does advocate is the political discourse in which emotion is imbedded as the impetus to political action; she relates this particularly to the civil rights movement and, of course, to radical feminism. Here she notes a shift in attitude toward emotion: in this discourse it becomes efficacious for spurring political action. Boler sees post-structuralism as fitting under this discourse.

While Boler views emotions as “a starting point for critical inquiry” (Boler, 1998, p. 5), her assertion that emotion is best situated in the feminist discourse as the impetus for educational change is specious and limiting. Championing emotion as part of the feminist ballast, and hence part of its blast, has politicized emotion, perhaps to its detriment.

Emotion as Ethic of Care

Nel Noddings espouses a universal human need for care, which can be said to reflect Martin Heidegger’s “care as the very Being of human life” (cited in Reed & Johnson, 2000, p. 247) and Iris Murdoch’s attentive care (in Reed & Johnson, 2000, p. 248). Noddings (2001) places the ethic of care in a cultural setting, which includes both ethnic and work cultures (p. 99). She rejects care “as a mere feeling, [where] caring seems to conflict with the hard intellectual and managerial work of teaching,” and prefers to refer to caring as “a way of being in the world” (2001, p. 99). Noddings’ search for a description of definition of caring leads her to the concept of being attentive, when “I allow myself to be moved by the other’s needs and feelings,” or experience what she calls “motivational displacement” (2001, p. 100). This trait would fit with Goleman’s competence of empathy. Similar to Goleman’s espousal of teaching emotional

intelligence, she advocates the modeling, encouragement, and nurturing of care, specifying the importance of covenantal, not contractual relationships. Noddings (2000) places feelings and interconnectedness to the rest of the human race, not as virtue, but as relational concept involving both the care-giver and the care-receiver, avowing that this ethic of care should be the essential focus of education (p. 252). Noddings' ideas are not in direct contradiction to the proposals of neuropsychology; in fact, her ethic of care has been a positive influence in deflecting educational theorists away from the epistemological focus on cognition.

Teaching as Emotional Work

Anne DiPardo and Christine Potter (2003) confirm that there has been educational recognition of the “at-once cognitive and affective nature of teaching and learning” (p. 319), but, like others, denounce the lack of explicit theorizing which would conceptually frame the role of emotion in education. They look to Vygotsky, who saw emotion and cognition as integral parts of human life and believed that emotional responses originated in the human brain (DiPardo & Potter, 2003, p. 323). DiPardo and Potter (2003) conceive emotions as developing “in concert with the whole of a person’s cognitive and social life, continually constructed through social interaction and progressively internalized” (p. 320). Relating their constructivist notion of emotion to teacher’s lives, they deplore the “intensification” (DiPardo & Potter, 2003, p. 323) of teaching, where teachers have been made responsible for an exponentially spiraling curriculum, leading to teacher burnout and drop out. The authors recognize and cite Damasio’s work in attesting that “emotion is indispensable to rationality” (DiPardo & Potter, 2003, p. 323) and that “emotions are inevitably present in any teaching/learning event” (DiPardo & Potter, 2003, p. 337). However, they caution against using such concepts as emotional intelligence as “gist for

facile workshops or administrative quick fixes” (DiPardo & Potter, 2003, p. 337).

Rather, they exhort the neo-Vygotskyians to develop a “politically viable base in order to argue for enhanced attention to emotion in teacher education, in teacher development, and in empirical research on teaching and learning” (DiPardo & Potter, 2003, p. 337). I concur.

Implications for Education: Brain-based Practice

Notable in the quest to apply brain-based research to pedagogy are two educators with publications sponsored by the Association for Supervision and Curriculum Development (ASCD), Robert Sylwester and Eric Jensen.

Robert Sylwester, a Professor of Education at the University of Oregon is a pragmatist. He sees his role as providing non-technical information to teachers in order to improve their practice (Sylwester, 1995, p. vii). He regards teacher practitioners as the prime players in what I will refer to as the “Saviour Syndrome,” exhorting teachers to be behaviourists (1995, p. 2) and to become informed so that they will not be “vulnerable to the pseudoscientific fads, generalizations, and programs that will surely rise from the pool of brain research” (Sylwester, 1995, p. 6). Despite stipulating that educational applications of brain-based research are “quite tentative” (1994, p. 64) and that “the educational applications of much of this research aren’t yet clear” (1995, p. 5), Sylwester proceeds in his book to suggest educational practices based on this same brain-based research.

Sylwester (1995) advocates a number of school practices, such as using praise and encouragement to create a positive emotional climate in the classroom; challenging each student at the appropriate level; developing procedures that “enhance our brain’s strengths and minimize the negative effects of its weaknesses” (p. 141); and using

metacognitive activities to enhance empathy by exploring motivations, such as asking questions like, “Why did the pioneers settle where the two rivers come together?” instead of “Where did the pioneers settle?” (p. 141).

Eric Jensen (2000), a teacher also connected to ASCD, says that while neuroscience has much to offer practitioners, “we must be cautious about taking research out of the laboratory and into the classroom” (p. 76). He proposes that sound pedagogy must not only examine neuroscientific findings, but combine them with psychology (Jensen, 2000, p. 76). He calls schools that ignore brain research “reckless” (Jensen, 2000, p. 76). His claims are based on his experiences at SuperCamp, what he refers to as “an experimental, cutting-edge academic program” (Jensen, 1998, p. viii). According to Jensen (1998), brain research is useful to “suggest ideas or paths that have a higher probability of success”(p. 6); these ideas must then form the basis for action research. Jensen’s brain-compatible learning sees the mind as a process (1998, p. 15) and encourages educators to develop curriculum that encourages “the exploration of alternative thinking, multiple answers, and creative insights” (1998, p. 16). Among his other recommendations are setting school schedules and activities to correspond to student circadian rhythms and brain cycles, promoting healthy eating habits, drinking lots of water to hydrate the brain, and using music to promote learning (Jensen, 1998, pp. 24-26). Regarding emotions, Jensen (1998) exhorts teachers to “engage emotions as a part of the learning, not as an add-on” by utilizing drama, art, narratives, and games; celebrating student accomplishments; using journals to encourage emotive introspection; and using physical rituals, such as chants or clapping patterns, to anchor emotion (p. 80).

Both Sylwester and Jensen see emotion as a tool to promote cognitive function. They claim that research supports their proposals to improve pedagogy, although

Jensen's caution that "too much interest in the biology of this movement may take up valuable time for something else more important: the practical work needed for the transformation of education" (1998, p. 114) is somewhat contradictory. His caution calls into question why he would negate the research that forms the very base for his assumptions. Neither author cites nor elucidates a theoretical background for his proposals or practice; as a result, both risk being labeled the equivalent of educational gurus who travel from engagement to engagement selling their doubtful wares. In their well-meaning vigor to have teachers save the world from emotional chaos and the breakdown of society, they have taken brain-based research and rushed into the amorphous arena of non-theoretical praxis without explicating the complex ontology of emotion.

Neuropedagogy: How do we get there?

There is a clear acknowledgement regarding the paucity of current theoretical discourse about emotion and its role in education. Ria, Seve, Saury, Theureau, and Durand, who also cite Damasio's work, postulate that the lack of research on emotion in situ, is "in part because of the difficulty of adopting a coherent theory and method to document emotions" (2003, p. 219). In addition, perhaps educational theorists have inadvertently avoided the arena of emotion due to the post-positivistic reaction to the scientific model. If this is true, neuroscience can assure that it has adopted a mixed-method approach for gathering data on and forming theories about emotion. Feminists may have deterred theorists from exploring emotion because of its highly political cast. Whatever the reasons for shunning the controversial arena of emotions, continued discoveries about the role of emotion in brain/body function have demanded its recognition. Educational theory has spent several decades in diasporadic exploration of

various discourses. It is time to leave off the proverbial wanderings in the desert and come together to seek a new focus. Current educational discourse is disjointed and often counter-productive; DiPardo and Potter (2003) have referred to emotion as a possible “interdisciplinary focus” (p. 337). They see the role of emotionality “as an untapped vein” that “holds key implications for research, policy, and practice: (DiPardo & Potter, 2003, p. 339). The need to reconceptualize the field of education is obvious; neuroscience, whose past cognitive focus seems a paradox to the current research eminence of emotion, has provided the basis for a much needed paradigm shift. I propose a new cynosure called neuropedagogy, defined as the use of neuroscientific findings as a basis on which to theorize the role of emotions in teaching and learning.

Curriculum theorists, however, should not look to using the emotions to access the mind nor to negate the role of cognition, but rather to address the emotional mind. Somehow we must create constructs that will forge a new direction and address the need for emotional literacy: without it, reading literacy and numeracy programs will continue to enjoy limited success, for even if children can read and count better, if they are still slitting each other’s throats and shooting each other over miscommunications and misunderstandings, how can we call it progress? There are steps that must be taken which will lead to legitimate neuropedagogy. Vygotsky and others ventured there without the research findings to which we are now privy. We should start by carefully examining neuroscientific findings and theorizing anew about the role of emotion.

I would advocate that educators first examine the neurobiological findings on emotion as an integrated function of the mind and body, and, in conjunction with psychology, apply these precepts to human behaviour. I propose a new theory that places emotion as central to being human: not as a detriment nor a folly, not as an accessory nor

a bridge to learning, not as gender-based nor politically embedded, but an emotion as the focus of all educational discourse, as the focus of education. Neuropsychology reveals emotion as the key to understanding ourselves and our fellow man. Neuroscientific brain research has shown emotion to be fundamental to motivation, to self-esteem, to decision-making, to learning, indeed, as Damasio (2003) says, to human flourishing (p.283).

There is a need to shift curriculum focus from knowledge about things to knowledge about ourselves, for it is only when we comprehend ourselves that we can truly understand the rest of the world. Changing the focus of education will, without doubt, not be an easy nor a simple task. I propose we begin by shifting our view of emotion, by giving it new status, not a replacement for the intellect, but as a thing that co-exists with the intellect, that co-functions with the intellect. This paradigm shift will involve educating professors, teachers, students, parents, and politicians. People must know what neuropsychologists have discovered: that the brain is not primarily reason, but a combination of emotion and thought. Curriculum should reflect neuroscientific knowledge about emotion and brain/body function to enable us to become not only meta-cognitive, but meta-emotive. This knowledge is not a set of skills to master, not an isolated course added to the curriculum, but the hub in a new wheel, a new conception of education that reflects the way our brains work. Bringing about this change stands as a formidable task.

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