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THE MOTIVATED BRAIN
Improving Student Attention, Engagement, and Perseverance

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Foreword

Perspectives on Our Emotional Nature and Implications for Educational Advances

Gregory and Kaufeldt superbly summarize the implication of our ever-increasing scientific understanding about our fundamental emotional nature on the development of better educational practices. The affective neuroscientific understanding of animal emotionality has helped illuminate some of the greatest mysteries of human existence—the basic psychological forces that motivate people, both young and old, to behave in characteristic ways (Panksepp, 1998a; Panksepp & Biven, 2012). Indeed, our personality structures reflect the strengths and weaknesses of our various affective strengths and weakness, mental powers that we share in kind, if not precise detail, with other mammals. In medicine we have learned the underlying principles by which human bodies operate through detailed studies of animal bodies. In education, the neuroscientific understanding of our affective minds will help inform and refine our instructional practices. Furthering that understanding is the great achievement of this book.

All our brains’ basic affective functions—“evolutionary memories”—enhance our capacity to anticipate survival issues. Through learning, our brains promote knowledge of the world. It is important for educators to understand such foundations of human minds, and how they can inform development of new educational practices.
The fundamental importance of our children’s affective lives is superbly illuminated in this book. Surprisingly, this possibility has emerged substantially because of our increasing knowledge about the minds of other animals, especially the diverse attentional, emotional, and motivational systems that constitute the core of organismic psychological coherence. As we better appreciate the emotional “tools for living” built into all mammalian brains, we can enhance educational experiences for all children. We must obviously minimize the negative affective forces of FEAR (anxiety), RAGE (anger) and PANIC (separation-distress/psychological-pain/loneliness systems), but with that work done, we must amplify the diverse intellectual riches that only a full engagement of the SEEKING system can provide—the massive emotional-motivational system that supports our urges to PLAY with and CARE for others, not to mention turmoil of LUST emerging in adolescence. An understanding of these systems tells us much about where we should be going in our educational processes. This book clarifies important dimensions of human existence, while drawing out didactic implications.

Thus, this text offers a clear understanding of our emotional nature and how that beneficially affects educational practices. It is among the first to consider the spectra of wisdom emerging from ongoing neuroscientific inquiries: we are born emotional creatures. Child-rearing practices that respect this are already providing superlative guidelines for improving child development (Sunderland, 2006).

This book introduces educators to our fundamental emotional processes that come at various levels of complexity within the bottom-up hierarchical structures of mental development, that eventually, with normal maturation and education, allow children healthy top-down regulation of their urges. Among the brain’s emotional networks, the SEEKING system—long inappropriately called “The Brain Reward System” (in fact, there are many rewarding systems in the brain)—is the one that deserves the greatest emphasis in education. Being the foundation for healthy exploration, with feelings of enthusiasm and curiosity, understanding this system is critical for students to become active learners.
Because it mediates so many important functions of the brain—contributing critically to CARE, LUST and PLAY—the SEEKING system facilitates both the enthusiasm for and reinforcement of learning. At the most basic level, this system promotes finding all things in the world needed for survival. Its fundamental nature (prior to learning) is to project children into the world as enthusiastic activists who can look after their own welfare—expertly harvesting both nuts and knowledge, so to speak. This remarkable system, always at the ready most of our waking moments (and super-active also during our dreams that help consolidate life-supporting strategies), is the focus of this remarkable book. If we can encourage children to be active seekers of knowledge, many of our educational efforts will have lasting positive consequences for structuring each child’s world and future success.

How we do this remains more of an art than a science, but Gregory and Kaufeldt’s superb guidelines can enhance success. They provide guidelines for implementing the SEEKING system within our educational practices. The book covers general principles that need to be understood, recommendations for specific practices, and suggestions for implementing these practices. They bring educators a new level of scientific sophistication for discussing the many issues that need to be considered for educational practices to be harmonized with the natural functions of the brain. These are beyond long accepted standard-bearers of learning and memory—those who understood the importance of reinforcement contingencies—which had great impact on educational practices during the 20th century.

In 1930, one of the fathers of behaviorism, John Watson, wrote “Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I’ll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors” (Watson, 1930, p. 82). His compatriot, B.F. Skinner, gave us automatic learning machines where rapid reinforcement of correct answers clearly sped up learning. The ingredient that both
missed was any discussion of how we help create internally motivated, enthusiastic, active learners. That is what a fuller consideration of the SEEKING system in education provides and what this book offers. The book speaks clearly and effectively about how we can recruit the affective emotional-mental resources that all children share to help facilitate the growth of upper-minds with active engagement with new information and perspectives. Superb teachers implicitly understand such issues, but this book makes many of the issues explicit.

A secondary theme developed by the authors is the benefit that we can achieve by recruiting the powers of PLAY for our educational ends. This primal emotional system that our group first started to study in animal models in the late 1970s has entranced us more than any other, especially as the child-rearing, educational implications became ever clearer for me (Panksepp, Siviy, & Normansell, 1984). This system, which relies heavily on the SEEKING system (as do LUST and CARE), is also subcortically situated in very ancient brain regions. Indeed, our main empirical measure of social joy—“rat laughter” that can be evoked by systematically tickling, maps along the SEEKING system. In every place in the brain where we can evoke such playful sounds with deep brain stimulation, we have found the sites to be rewarding (Burgdorf et al., 2007), which is our main factual evidence for positive feelings in nonspeaking animals.

PLAY arousal appears to be the fundamental source of social joy, which, just like the enthusiasm of the SEEKING system, is at a low ebb in clinical depression (Panksepp et al., 2014). Once we realized that this ancient brain function is elaborated by brain systems below the neocortex, we started to consider how it might affect child-development, especially if young children were deprived of having adequate avenues to express this system each and every day (Panksepp & Scott, 2013). We suspected that deprivation could lead to various Attention Deficit Hyperactivity Disorders (Panksepp 1998b). Indeed, to our surprise, all medications typically used to treat ADHD, such as methylphenidate, were strong reducers of play in young animals. Why would psychostimulants reduce such a psychologically robust behaviors such as PLAY?
We still don’t quite understand the details, but we must be worried about children in the classroom who have not had their fair share of the satisfactions of physical play. Our animal work indicates that abundant play sets in motion many brain systems that not only facilitate learning but promote happiness (Burgdorf et al., 2011). The many benefits of play should alert educators to the problems that may emerge when children are deprived of this vital resource for mental health. Without a regular diet of fun social engagements, children become hungry for play and begin to “act out,” potentially disrupting the flow of classroom instructional activities.

We have analyzed higher brain regions for gene-expression patterns, namely the neocortex, following bouts of abundant social play in juvenile animals. Of the approximately 1,200 genes we monitored, one third were significantly jogged one way or another by the playful activities (Burgdorf et al., 2011). Surely this means that playful activities, and other forms of SEEKING, promote a healthier, prosocial learning platform for learning activities and the maturation of happier brains that are resistant to depression (Panksepp et al., 2014).

Indeed, Finland’s government has decreed that grade-school children should have 15 minutes of free play during each hour that they are in class. Teachers were initially resistant, but once they saw how effectively this facilitated their teaching efforts, they became staunch supporters of common sense. Indeed, what this fine and uncommon book on educational practices offers is a vision of how we can maximize the vast potential benefits of education, by getting better acquainted with the intrinsic emotional/motivational powers of children’s minds. Through an appreciation of these universal ‘lower’ powers of their minds, we may have more success in molding the ‘higher’ spaces into receptacles for all the intellectual riches that we have to offer.

In sum, it is becoming increasingly clear that the higher intellectual qualities of human minds, just as those of other animals, are constructed by diverse emotional and motivational circuits in the brain that mediate diverse feelings that are currently illuminating, for the first time, how affective experiences are created within all mammalian
brains. Better ways to utilize such mental energies to facilitate classroom activities are superbly summarized in this remarkable book.

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Motivation, enthusiasm, perseverance, drive, grit, and tenacity are currently very hot topics in education. Understanding how to get students to pay attention and engage in rigorous tasks is something every teacher desires.

The field of cognitive psychology provides educators with many models about how to trigger motivation and keep students engaged. For example, Stanford psychologist Carol Dweck’s (2006) work helps teachers understand how to promote growth mindsets versus fixed mindsets. In 2013, the U.S. Department of Education published a report titled *Promoting Grit, Tenacity, and Perseverance: Critical Factors for Success in the 21st Century* (Shechtman et al., 2013) that noted that beyond content knowledge, it is imperative for educators to learn how to address a core set of noncognitive skills. “These factors are essential to an individual’s capacity to strive for and succeed at long-term and higher-order goals, and to persist in the face of the array of challenges and obstacles encountered throughout schooling and life” (p. 19). The document makes strong recommendations about how the educational community must shift priorities and begin to design learning environments that promote the attributes, dispositions, social skills, and attitudes of these critical noncognitive skills.

In addition, the new scientific discipline of affective neuroscience takes into consideration basic mental processes, brain functions, and emotional behaviors that all mammals share. It combines the study
of the neural mechanisms of emotions as well as the psychological study of mood, feelings, and personality. By studying mammal brains and using neuroimaging technologies, Jaak Panksepp, Kent Berridge, and other neuroscientists have been able to locate and identify the ancient neural networks where primal emotions are generated (see, e.g., Panksepp & Biven, 2012; Pecina & Berridge, 2013). These ancient neural systems are located in the subcortical area of the human brain, deep below the neocortex—our “thinking cap.” We can now identify the specific locations in the brain where motivation and enthusiasm are generated. Investigating these emotions will help psychiatrists and mental health professionals design more effective treatments. But educators and parents, too, will benefit, by discovering insights into child development, behavior, and how these primary emotions shape our feelings, mold our motivations, and ultimately influence learning.

Educators have a keen interest in understanding how they might improve student attention, perseverance, and engagement. This book will link the cognitive psychology models with affective neuroscience and provide practical examples of how educators can promote enthusiasm, generate motivation, and encourage perseverance in even the most disengaged student.

Our Background

For almost four decades, we have investigated emerging research in cognitive psychology and educational neuroscience and have attempted to translate the findings into practical classroom applications. We have written many books for educators on how instruction and student success might be improved if the strategies that teachers used were compatible with what we know about how brains learn naturally. Originally referred to as “brain-based” and “brain-compatible” teaching, this instructional pedagogy is now often labeled “brain-friendly.” The philosophy and strategies encompass the following elements:

- The design of the learning environment
- The use and scheduling of time
• The integration of play and joyfulness
• Opportunities for firsthand learning and outdoor experiences
• The importance of collaboration and social interactions
• Relevant and meaningful connections to the content
• Respectful understanding of students’ cultures, interests, and prior experiences
• The importance of student voice, choice, and self-determination

In the last few years, our work—including this book—has been dramatically influenced by the research of Dr. Jaak Panksepp from Washington State University. In 2012, at the Learning and the Brain conference in San Francisco, Panksepp presented his theory that many children today never get sufficient amounts of natural, self-generated play. He concludes that this may be one of the reasons that children develop hyperactivity and attention disorders and also lack impulse control. Panksepp's research has led him to help launch an emerging scientific discipline referred to as affective neuroscience. This branch of brain research is the study of the neural mechanisms of basic animal and human emotions. This interdisciplinary field combines neuroscience with the psychological study of personality, emotion, and mood.

Panksepp has spent his career first identifying and then studying seven primary emotional processes that are shared by all mammals. He contends that SEEKING is an inherited primary emotional process and is the key to survival, learning, and connections. This amazing research contributes to our understanding of the neuroscience of motivation and the SEEKING system that we discuss in this book. Understanding this basic primary emotion will help us understand motivation. The research around SEEKING, and especially its role in the release of dopamine, confirms many of the points that educational innovators have been suggesting:

• The effects of chronic stress and poverty have a great influence on a student’s chance to be motivated and to ultimately succeed.
• Opportunities to play and socialize within a safe and secure climate and environment promote a student’s motivation.
• A growth mindset and the ability to persevere when faced with setbacks are skills that can be developed with practice and opportunities to make mistakes.

• Relevant real-world projects and problems that demand imagination, creativity, problem solving, and communication skills (i.e., 21st century skills) can be highly motivating to students at any age.

• Opportunities to play, create, and work with peers are successful instructional strategies and motivators at any grade level, and they shouldn’t be dismissed in secondary and higher education settings.

• Integrating the routine use of age-appropriate current technology is imperative to inspire student motivation.

Outdated Educational Systems

Many of us are concerned that students in our classrooms today will not be prepared to adapt, create, persevere, innovate, and solve problems as they become adults. With technology advancements happening at astonishing rates, the gap between what students know and what they need to know to be successful after graduation is widening quickly. According to educator Alfie Kohn (2014a):

Traditional schooling isn’t working for an awful lot of students. We can respond to that fact either by trying to fix the system (so it meets kids’ needs better) or by trying to fix the kids (so they’re more compliant and successful at whatever they’re told to do).

It often seems that the very champions claiming to be most invested in education are responsible for the paralysis of our fundamental beliefs about education and our elaborate, though archaic, delivery systems. In Human Brain and Human Learning (1983), Leslie Hart posited that designing educational experiences without knowledge about how human brains learn naturally and most efficiently can be compared to designing a glove without any knowledge of the human hand. More than 30 years later, how can our educational system continue to promote and implement curriculum and programs
that don’t seem to “fit” with how brains learn? How can we then complain about a poor educational system, unmotivated students, and less than stellar assessment results?

We know that young human brains are intrinsically motivated. They are enthusiastically SEEKING, in Panksepp’s term, in an ongoing and positive way. Shouldn’t classrooms be designed and orchestrated to maximize opportunities to explore and engage with the concepts and skills most appropriate for success in the 21st century?

**Try It, You’ll Like It**

Pritchard and Ashwood (2008) define motivation as “the process used to allocate energy to maximize the satisfaction of needs” (p. 6). Our challenge as educators is this: how can we encourage students to allocate some of their energy into their learning and school experiences? If we examine how intrinsic motivation is generated in the brain, might we be able to understand ways to design classroom environments and curriculum experiences to encourage students to demonstrate more motivation to learn? Neuroscience research is suggesting that intrinsically motivated behaviors are actually exploratory behaviors. By investigating recent research in the field of affective neuroscience, we can gain a better understanding of the elusive “motivation X factor.”

For teachers who may feel like they don’t have autonomy or the flexibility to implement strategies to promote student motivation, we say, “Just do it”! Even if these strategies are implemented sporadically and interspersed within traditional one-size-fits-all instructional strategies, students will appreciate the opportunities to think, collaborate, and create. Even infrequent implementation may encourage unmotivated students.

We have found research on the SEEKING system to be a great help to us as we rethink curriculum design and classroom instruction in an effort to promote student engagement and motivation. We believe that the information and strategies you’ll find in this book will inspire you to continue SEEKING powerful learning opportunities for your own students.
Engagement and motivation—what’s the difference? Teachers everywhere strive to motivate their students and engage them in learning. Can we really motivate others, or is it a personal thing that happens when conditions are right? The English words *motivation* and *movement* are derived from the Latin *movere*, “to move.” The German philosopher Schopenhauer (1999) suggested that motivation was the result of all organisms being in a position to “choose, seize and even seek out satisfaction.” Neo-behaviorists Hull and Spence used terms such as *drive* and *incentive* as synonyms for motivational concepts.

Paul Thomas Young (1961) defined motivation as the process of generating actions, sustaining them, and regulating the activity.

Salamone (2010) suggests that motivation processes allow organisms to regulate their internal and external environment, seeking access to some stimuli and avoiding others. Sutherland and Oswald (2005) suggest that engagement is not just a simple reaction of a student to a teacher’s action but is much more complex.

Although there are many definitions of motivation, with some stressing the notion of movement that would suggest engagement, we should not assume that motivation and engagement are synonymous. Sometimes the terms are used interchangeably, but really *motivation is the force or energy that results in engagement*. In a classroom, the
complex interaction of teacher, student, and curriculum helps to create motivation that yields high engagement.

**Motivation, Drive, Tenacity, and Grit**

Motivation, drive, tenacity, and grit are currently hot topics. A variety of opinions and theories are emerging from cognitive psychology about how important these skills are to one’s success in life and how to promote them.

**Self-Efficacy**

Students arrive at school with an already well-developed self-image of competence or incompetence resulting from messages they have received at home since birth. Whether they have been encouraged to persevere when faced with challenges or coddled and discouraged from taking risks to overcome obstacles, students’ beliefs about their abilities will affect their level of motivation and engagement. A learner’s self-efficacy (one’s belief in one’s ability to succeed in specific situations) can greatly influence his or her motivation. In general, students with high self-efficacy are more likely to give more effort to complete a task and to persist longer than a student with low self-efficacy (Bandura, 1986). Their world-view of “never give up” and can-do attitude are essential to success.

Social beliefs related to gender or race also contribute to one’s mindset about performance level. Gender bias messages or cultural cues may influence whether students feel capable or possibly doomed to failure (Aronson & Steele, 2005). These beliefs can be instrumental in helping to motivate discouraged learners.

**The Yerkes-Dodson Law of Arousal**

Each of us reacts to a stimulus differently. For example, a project or task offered to a group of students will prompt a full range of responses related to motivation, from excitement to boredom. Students will react negatively or positively depending on how they perceive the difficulty of the task or the challenge involved and the
interests they have. Their mindsets as to the probability of success will influence their excitement or frustration facing the task and thus, ultimately, their motivation.

The relationship between pressure (arousal) and one’s performance is known as the Yerkes-Dodson law (Yerkes & Dodson, 2007). As stress and pressure rise, performance usually improves. At the peak of the curve, one has reached “maximum cognitive efficiency” (Damasio, 2003). One’s performance will not likely improve no matter how much additional pressure or stress is exerted. In fact, performance and motivation may begin to diminish if pressure continues. We can benefit from the endorphin rush that occurs when we increase our level of stimulation by pushing ourselves physically or mentally, but at the apex of optimal performance is a tipping point. Like the Goldilocks theory, the Yerkes-Dodson law notes that in some cases there could be either too low or too intense an arousal. The ratio of stress to performance needs to be “just right” for each individual learner in order to maintain motivation.

**FIGURE 1.1**

Yerkes-Dodson Law of Arousal

We need to strive to provide the “just right” balance of excitement and challenge without undue stress for our students. Prior experience with similar tasks may influence one’s reaction and degree of
motivation. Tiered lessons and adjustable assignments (Gregory & Chapman, 2013) attempt to do this. So the trick is to find the optimum level of challenge that engages, and is enjoyable and safe for every learner (see the sections on flow and the zone of proximal development in Chapter 5).

**Drive**

In *Drive: The Surprising Truth About What Motivates Us*, Daniel Pink discusses research from the last 50 years on *intrinsic motivation*—motivation that comes from within ourselves. Carrot-and-stick enticements, or *extrinsic rewards*, not only don’t work in the long run but may actually lower performance, stifle creativity, and decrease the desired behavior. We have an inherent tendency to seek out novelty and challenges, to extend and build our capacities, to explore, and to learn (Pink, 2009). Mostly people are motivated to do interesting work with supportive colleagues.

In his research, Pink found that people do not respond to monetary rewards and punishments as compared with being given the opportunity for

- autonomy—people want to have control over their work;
- mastery—people want to get better at what they do; and
- purpose—people want to be part of something that is bigger than they are.

**Grit**

Another popular look at motivation includes research gathered by Angela Duckworth, a psychology professor at the University of Pennsylvania. She suggests that grit entails “working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity and plateaus in progress” (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087). Duckworth and her colleagues define grit as “perseverance and passion for long-term goals,” (p. 1087). Grit can be a positive indicator of success in the long haul. It adds the component of passion to the trait of persistence. The Intelligence Quotient (IQ) is not always the determining factor in student success, but grit can be,
although it is not tied to intelligence. We need to rethink how hard and where we challenge students with unfamiliar and uncomfortable tasks. Many students with a high intelligence may decide to take the safe route and are not particularly successful in life, whereas students with average intelligence and a good level of grit often far surpass their high-ability peers as grit predicts success beyond talent.

Grit is not just having resilience to overcome adversity, bounce back from challenges, or survive at-risk environments. Grit is also staying the course, much like the Tortoise in the famed fable. The Tortoise persists even though his journey is slower and more tedious. The Tortoise wins the race because the Hare (a more talented runner) meanders and becomes distracted along the way. Grit is about being able to commit over time and remain loyal to goals that are set (Duckworth et al., 2007).

Developing grit requires multiple rehearsals with content or skills to achieve success and develop mastery. We teachers must tap our creativity to provide the practice that diverse learners need, making sure to offer a variety of multisensory tasks that appeal to students’ varied learning preferences. This practice blends the “art of teaching” based on what we know from the research base of impactful strategies, and the “science” of teaching (Hattie, 2009; Marzano, Pickering, & Pollock, 2001).

We must be careful not to come at grit from a fear-based focus on testing and college selection, especially with young adolescent brains that are more susceptible to negative or critical reactions. Poorly informed teachers and parents may attribute a lack of success to a lack of grit without analyzing the full situation with regard to other issues, such as missing support or resources. Psychologists refer to this sort of misperception as “fundamental attribution error.” In addition, perseverance that emphasizes punishments and rewards will undermine long-term grit. Grit is different from passion because grit requires effort and fully engaged commitment to be successful.

**The Secret to Success Is Failure**

In *How Children Succeed: Grit, Curiosity and the Hidden Power of Character*, Paul Tough (2012) makes significant contributions to Duckworth’s notion of grit in regard to education. He postulates that
in the real world, learning to react to failure is as critical to success as academic achievement. Noncognitive character traits such as resilience, persistence, drive, and delayed gratification are as important as cognitive skills (Farrington et al., 2012). If we don’t learn how to deal with frustration and obstacles, we are not likely to choose challenging or risky paths and perhaps lead a life of mediocrity and predictability. The trait of delaying gratification is necessary to persevere despite encountering obstacles.

**Emotional Intelligence**

Emotional intelligence (EI) is a person’s ability to use her or his emotions mindfully. It consists of a balance between emotions and reasoning. Daniel Goleman (1995) believes that EI, like grit, is more important than IQ.

Goleman describes EI as composed of five emotional competencies, or domains: self-awareness, managing emotions, self-motivation, empathy, and social skills. He regards these domains as the keys to success in the 21st century.

- **Self-awareness.** This domain entails our ability to identify and name our feelings and to articulate our emotions. We can differentiate with precision a feeling and identify (beyond a basic feeling such as sadness) the more complex feelings of anxiety, upset, depression, or disappointment. We are not engulfed with the feeling and can name and then deal with them.

- **Managing emotions.** Once feelings are labeled, we can begin to think about how to handle them—how to soothe or change the mood or, if anger is the issue, how to resolve conflict.

- **Self-motivation.** If we can motivate ourselves, we can develop competencies such as setting goals, delaying gratification, and persisting. Being able to self-motivate is actually a state of mind—a certain level of mindfulness. Those who are self-motivated are often more successful in life, unrelated to their socioeconomic position and cognitive intelligence, because they have an inner drive and determination to persist.
- **Empathy.** Empathy is the ability to feel for someone else or to stand in another’s shoes. Being able to read and understand the feelings of another builds tolerance.

- **Social skills.** People with good social skills have the ability to use interpersonal skills to interact appropriately with others. They are able to read and respond to people in a positive way. They are said to have “social polish.” Their teamwork skills are refined, they are collaborative, and they have social influence.

Emotional intelligence derives from the communication between your emotional and rational “brains.” Initially, primary senses enter the spinal cord and move through the limbic system (emotional center) to the frontal lobe of your brain before you can think rationally about your experience. In other words, an emotional reaction occurs before our rational mind is activated. Emotional intelligence requires a balance between the rational and emotional centers of the brain (see Figure 1.2).

![Emotional Intelligence](image)

*Emotional intelligence is a balance between the rational and emotional centers of the brain.*
Plasticity is the term neuroscientists use to describe the brain’s ability to grow and change. The change is incremental, but as we consciously practice new skills, permanent habits form. Using strategies to increase emotional intelligence allows the creation of billions of neutral connections (dendritic growth) between the rational and emotional areas of the brain. A single cell can grow up to 15,000 connections (dendrites) with nearby neurons. We make new connections as we learn new skills, including emotional intelligence strategies. Practicing will strengthen those neural connections, and over time new behaviors will become habits.

Figure 1.3 lists the five domains of emotional intelligence and suggestions to foster this trait in students, with possible applications that may support the domain.

<table>
<thead>
<tr>
<th>Domains</th>
<th>How to Foster</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-awareness</strong></td>
<td>Ability to identify and name a feeling or emotion and how it might affect others</td>
<td>Have discussions to help students differentiate emotions and label them.</td>
</tr>
<tr>
<td><strong>Managing emotions</strong></td>
<td>Labeling feelings and responding accordingly; includes self-regulation</td>
<td>Help students identify feelings and discuss how they might best respond. Use “teachable moments” when situations happen.</td>
</tr>
<tr>
<td><strong>Self-motivation</strong></td>
<td>Ability to set goals, persist, and delay gratification</td>
<td>Help students develop strategies to persist and problem solve to continue to move forward.</td>
</tr>
<tr>
<td><strong>Empathy</strong></td>
<td>Ability to feel for another and understand his or her feelings</td>
<td>Prompt students to think about others’ feelings and feel “with them.”</td>
</tr>
<tr>
<td><strong>Social skills</strong></td>
<td>Ability to “read” another person, respond appropriately, and build rapport and common ground.</td>
<td>Explicitly teach social skills. Practice social skills when using group work.</td>
</tr>
</tbody>
</table>

Source: Adapted from Bradberry and Greaves (2009). This resource provides concrete, practical ways to increase one’s emotional intelligence.
Belief Through Effort

Fredricks (2014) suggests a multidimensional view of engagement that considers behavioral, emotional, and cognitive engagement and their integration.

Behavioral engagement consists of such things as positive actions (e.g., compliance with classroom rules and school norms), nondisruptive behaviors (attendance and orderliness), effort and participation, and school community involvement (sports and clubs). Students who have behavioral engagement “play the school game” and it is easy to observe these students. Engagement here refers mainly to on-task behavior.

Emotional engagement entails students’ emotional reactions to school, whether there is a feeling of belonging, and whether they value tasks and school. Emotionally engaged students are vested in school and connected to it. This type of engagement is often overlooked. The more interest, positive attitude, and task satisfaction (without anxiety, stress, and boredom), the greater the engagement.

Cognitive engagement refers to students’ investment in tasks and challenges, as well as their perseverance in completing and tackling challenges. They are aware of what they are doing and why, both hands-on and “minds-on” for a specific strategy or task. Cognitive engagement also includes self-regulation, strategic planning, and reflection. It often is described as “deep” rather than “surface” learning.

Self-Determination Theory

Self-determination theory (SDT) suggests that we are driven by a desire to continually grow and reach fulfillment (Deci & Ryan, 1985). We are centrally concerned with how to move ourselves or others to act. We need to master challenges and experiences to develop our sense of self. Deci and Ryan recognize two basic reward systems, intrinsic and extrinsic. Intrinsic rewards tap into inner potential and interests, allowing us to express our true self and growth. Extrinsic rewards provide tangible rewards or incentives such as stickers, pizza parties, and bonuses. Deci and Ryan suggest that individuals tend to move toward the innate need to grow and gain fulfillment. We need to feel the following to satisfy and achieve psychological growth:
• Competence and mastery of skills
• Connections and relatedness and a sense of belonging
• Autonomy, or a sense of control over their goals and behavior

If we achieve these, we become self-determined and are intrinsically motivated to pursue what is meaningful to us. Being constantly tempted and enticed by rewards undermines the intrinsic motivation that already exists in each of us. *Motivational crowding out* is the term used to describe how external rewards (e.g., money, prizes, recognition) may crowd out intrinsic rewards of a job well done and enjoyed. Thus, the common classroom practice of rewarding students with stickers, privileges, and so forth, can backfire when it comes to long-term motivation.

Deci, Koestner, and Ryan (1999) also suggests that intermittent positive encouragement and feedback on performance can increase one’s intrinsic motivation. Positive feedback makes us feel more competent and enhances personal growth. Deci and Ryan explain that the social environment has an impact on the growth. The environment can enhance or disrupt the growth of the human psyche. “Social environments can, according to this perspective, either facilitate and enable the growth and integration propensities with which the human psyche is endowed, or they can disrupt, forestall, and fragment these processes resulting in behaviors and inner experiences that represent the darker side of humanity” (Deci & Ryan, 1985, p. 6).

**Punished by Rewards**

Alfie Kohn (1999) talks about “punishment by reward” wherein we lose a sense of joy and accomplishment (i.e., intrinsic reward) because we are coerced into action by extrinsic rewards rather than spurred on by innate motivation. Kohn cautions that extrinsic rewards—“carrots”—may work in the short run but not in the long run; in fact, manipulating people with incentives may actually cause harm. He suggests these rewards only result in temporary obedience and do nothing to increase drive because most people lose interest in tasks that they are doing only for the reward. Rewards turn what should be satisfying tasks into
drudgery. Often lower-quality work is the outcome. Kohn cites 70 studies showing that the incentives/rewards such as As and pizza parties are not effective and can be counterproductive in the long term in regard to instilling a desire to learn and a strong work ethic in students. Praise is also not helpful, because it supports the idea of “fixed mindset” or intelligence (Dweck, 2006). More effective is corrective and supportive timely feedback and the encouragement for effort.

What if we got rid of grades and praise and focused on real learning? If the behavior needs to be manipulated to achieve compliance, perhaps something is wrong with the task. If learning is interesting, challenging, and meaningful, doing the work is its own reward. Students should not have to be coerced or manipulated to complete it.

**Basic Needs and Choice Theory**

The brain's original purpose was not to go to school but to survive and thrive. Several theorists have suggested which basic needs are most important to humans and suggest that these needs must be met in order to allow us to eventually focus on learning.

In 1968, psychologist Abraham Maslow proposed a hierarchy of human needs beginning with the most basic, as listed here (Maslow [1968]; see also Figure 1.4). These needs must be met before we can move to self-actualization.

- Physiological needs: food, water, air, shelter
- Safety needs: security, order, freedom from fear
- Belongingness and love: friends, spouse, children, family
- Self-esteem: self-respect, achievement, reputation
- Self-actualization: becoming what the individual has the potential to become

Glasser's (1990, 1998) choice theory of motivation cites five important needs. These are similar to Maslow's needs in many ways, although they are not arranged hierarchically (see Figure 1.5). Glasser suggests that all we do is behave, and almost all behavior is chosen. His choice theory focuses on the growth of relationships and not external control.
The behaviors that we choose are a personal choice and are always within our own control. Glasser suggests that we are driven by genes and have the following needs:

- The need to survive and procreate
- The need to belong and love
- The need to have some power
- The need for freedom
- The need to have fun

Glasser believes the need to belong, which parallels Maslow’s need for belongingness, is most important. If students feel disconnected and frustrated that their needs are not met, they will likely give up. A sense of not belonging is a major source of school failure (Glasser, 1998). Students need to feel that they belong and have some choices and a certain degree of personal control.
Choice theory focuses on seven caring habits that create conditions that draw people together and, conversely, seven deadly habits that push people apart and strain relationships.

<table>
<thead>
<tr>
<th>Love &amp; Belonging</th>
<th>Power</th>
<th>Fun</th>
<th>Survival</th>
<th>Freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>• belonging</td>
<td>• recognition</td>
<td>• enjoyment</td>
<td>• health</td>
<td>• choices</td>
</tr>
<tr>
<td>• being loved</td>
<td>• success</td>
<td>• laughter</td>
<td>• relaxation</td>
<td>• indepen-dence</td>
</tr>
<tr>
<td>• being respected</td>
<td>• importance</td>
<td>• learning</td>
<td>• sexual activity</td>
<td>• freedom from</td>
</tr>
<tr>
<td>• friendship</td>
<td>• achievement</td>
<td>• change</td>
<td>• activity</td>
<td>• freedom to</td>
</tr>
<tr>
<td>• sharing</td>
<td>• skills</td>
<td></td>
<td>• food</td>
<td></td>
</tr>
<tr>
<td>• cooperation</td>
<td></td>
<td></td>
<td>• warmth</td>
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</tr>
</tbody>
</table>

Choice theory also revolves around the following beliefs:

1. We can only control our behavior.
2. Information is all we can give someone else.
3. Most psychological problems are relationship problems.
4. Our past has everything to do with what we do today, but only our basic needs can be satisfied right now.

5. All behavior is made up of four elements: acting, thinking, feeling, and physiology.

6. We have direct control over acting and thinking, but we only control our feeling and physiology indirectly by how we choose to think and act.

Both Maslow’s and Glasser’s theories stress the notion of basic needs taking precedent over all else. As we think about motivating our students, we must recognize that their basic needs—as well as other needs such as feeling safe and belonging—must be met before they can focus on fulfilling higher-order needs such as learning and self-development.

Self-Efficacy

Another theory with implications for motivation is Bandura’s (1986, 1997) theory of self-efficacy. His basic premise is that people will engage in activities if they believe that they are competent in them. Students will be more likely to engage, persist, and succeed at tasks when they feel a sense of efficacy. Failure may be due to a lack of skills or the efficacy to use them. Bandura identifies the following classroom practices that inhibit feelings of positive self-efficacy:

- Direct instruction where students can get lost in the progression
- Low-ability groupings
- Highly competitive practices where some learners can’t possibly succeed

In contrast, Schunk (1989) suggests the following strategies to enhance students’ self-efficacy:

- Setting attainable personal goals
- Modeling statements of self-efficacy
- Focusing on constructive feedback
- Encouraging learners to articulate and share strategies that work
Diminished Student Engagement and Motivation: Eight Possible Reasons

What is responsible for lack of motivation? Educators across the country, teaching all socioeconomic groups, are asking, “Why aren’t these kids motivated?” As indicated by the theories just discussed, many factors can contribute to students’ lack of motivation. Other possible reasons include the infusion of technology into students’ lives, the expectation of immediate gratification, chronic stress, and living in impoverished conditions. These issues may not be in our locus of control.

But there are several school factors that we believe are contributing to low student motivation. These include lack of real-world application, apathy from students deriving from instructional mediocrity, social isolation (and bullying), and fixed mindsets. Fortunately, these are all aspects of education that we can do something about.

Technology

The digital natives coming to school today are very adept with and used to using technology that they are not allowed to experience in most classrooms. We sometimes have a skewed viewpoint when it comes to technology, blaming the distractibility of technology for students’ lack of engagement and learning.

Indeed, if we do nothing more than replace textbooks and encyclopedias with Google or Bing, or use the computer or tablet for nothing but writing exercises, technology in the classroom is not as motivating as using these tools to SEEK, find, and use information for problem solving and creativity. Advanced engagement through higher-order thinking and production are preferable uses for technology over the pursuit of trivia or gaming.

Unfortunately, because of a lack of hardware and sometimes teacher confidence and creativity, students are denied access to the very strongest engagement resource we have—technology. As we discuss in the next chapter, dopamine releases when students have a
chance to seek and explore using technology. Whether for research, inquiry, problem-based learning, remediation, or enrichment, many educators are missing the boat in terms of using technology to intrigue and engage learners.

**Immediate Gratification**

Some blame students’ apathy or lack of engagement on the fact that learners today are a “now” generation: if they don’t succeed on the first try, they give up. This learned behavior evolves from lack of persistence. When a student has had a series of failures or depends on others to help, that student may develop learned helplessness. Persistence can be frustrating as one struggles with issues or problems, which increases stress and the release of cortisol rather than dopamine, which in turn diminishes the commitment to a task. The cycle becomes one of “I try, I don’t succeed; I feel bad, so I give up.”

**Apathy**

Some students come to school at age 5 full of enthusiasm and excitement. For them, kindergarten and the elementary years introduce enough novelty, interesting tasks, and challenges to hold their attention. For other students, however, and in less inspiring classrooms, apathy can creep in. Direct instruction with little student interaction or project work, and problem solving under the guise of “covering the curriculum” to succeed on standardized tests are classroom practices that can foster apathy among our students. Some students “play the school game” and endure the monotony of day-to-day rote learning and lecture models, regarding education as their “job” and a means to an end (e.g., graduating, attending college, or finding a job). A large population of students can become bored and disengaged as the lessons are repetitive, lack relevance to their real world, and require only low-level thinking skills. Their passive receptivity to learning with a lack of emotional and cognitive engagement is perceived as apathy, when actually instructional mediocrity is at the root of the problem.
Lack of Relevance to the Real World

Many students believe that some of what is taught in school has no real meaning in the real world. Being told that this is “good to know” or “You might need this someday” is not necessarily engaging if you are only interested in the here and now. As educators, we need to be more overt and transparent as we connect student assignments to curriculum standards as well as real-world standards. Helping students see how writing a report, delivering opinions supported by evidence, and learning to collaborate, for example, are useful abilities in any professional role as well as in their personal life will let students see the curriculum’s applicability to their lives. Offering students choices of problems and issues to address in math, science, and social studies that affect or will affect their world in the future can be more motivating than traditional textbook work.

Fixed Mindsets About One’s Ability

Carol Dweck (2006) notes that some people develop a fixed notion of their intelligence, whereas others have a growth mindset. With a fixed mindset, we believe that we are born with a certain limited potential that blocks expansive thinking and fosters a lack of drive. On the other hand, a growth mindset involves the belief that with effort and persistence, we will improve, master tasks, and succeed. If students have come to believe in a fixed mindset, they feel there is no use trying. If they have endured seven or eight years of this approach, they can become passive, discouraged students who are not optimistic about the future and disengage so as not to fail.

Brooks and Goldstein (2008) say more effective teachers have a growth mindset that guides their behavior in the classroom. They convey a belief in the potential of all students through their words and modeling so that students in turn develop a growth mindset and become more willing to persevere despite setbacks.

Poverty

Depending on where you live there may be at least 20 percent of children who live in poverty. Based on 2010 census data:
• 22 percent of American children live in poverty
• 39 percent of black children live in poverty
• 35 percent of Hispanic children live in poverty

Children who have grown up in poverty have different brains for a variety of reasons: they may be malnourished resulting from a poor diet; they may have had fewer academic experiences and opportunities and so have limited prior knowledge in some subjects; their vocabulary, verbal skills, and language patterns may be limited. If they are second language learners and live in poverty, they have a double issue. They may perceive their social status as “less than” some peers, and their self-esteem may be low. Research shows that their IQ may be 30-40 percent lower than their peers (Griggs & Walker, 2008).

Social Isolation

Many students—not just those in poverty—do not feel comfortable in school. They don’t find it a safe haven for body or mind, and thus their basic needs are not being met. They are isolated for many reasons. Students who are English language learners perhaps lack motivation to engage in conversation or just can’t make sense of new concepts and therefore may develop learned helplessness. They may be illegal aliens or members of a migrant family who know that they are not going to be in their location for long and thus don’t want to become attached to or involved in the school culture. For other students, sexual orientation may be an issue that prevents them from becoming engaged with others or with the academic content. Some students with different cultural backgrounds have a difficult time connecting to what is being taught and how it relates to their prior knowledge or skills. There is often little effort made by the teacher to connect to their culture and make a “bridge” for the learning. A high degree of racism or bullying may be present in school that emotionally hijacks students. They are too occupied with self-preservation (physical or psychological) to be concerned with learning. All these conditions mean that students’ basic needs are not being met, and thus paying attention to what we think is important is not high on their list.
of priorities (National Research Council, 2003). These conditions also can create stress, the topic of the next section.

**Students Under Stress and Perceived Threat**

Stress, excessive pressure, and perceived threat can temporarily shut down enthusiastic motivation as our brains go into a default reflex response.

The brain contains a sensory screening process—basically a survival mechanism—whereby the brain scans the horizon for a potential threat. On the savannah, a threat might have been a wild predator. In modern classrooms, a variety of situations and circumstances may be perceived as threats and cause undue anxiety and stress: fear of ridicule or punishment, exclusion, being asked to keep seated and quiet, isolation from classmates, unclear expectations, or tasks that are too easy or too difficult.

The brain’s survival mechanism to respond to perceived threats in the environment is the reticular activating system (RAS), a primitive network of cells in the lower brainstem that acts as the gatekeeper to what information flows into parts of the brain responsible for higher-order tasks, such as learning. Under normal conditions, the amygdala directs incoming data to the prefrontal cortex (PFC), where the information can be sent processed into long-term memory.

The amygdala, located deep in the temporal lobes, triggers the body and brain to react with the appropriate fight, flight, or freeze response to the crisis and releases of a high level of stress hormones. This reflexive response takes over, and the executive, reflective brain functions are temporarily bypassed. When there is unmanageable stress, self-preservation takes over, motivation is reduced, and learning is minimized.

Neuroimaging has provided information about which parts of the brain are engaged when a threat is present. Emotions such as fear, anger, or sadness interfere with learning as the activity in the brain remains in primitive areas instead of in the PFC. The RAS sends the sensory input to the lower areas of the brain. The brain does its
original job in protecting the person from harm. The RAS directs the threatening sensory input through the amygdala to the primitive brain where fight, flight, or freeze is the order of the day. The primitive brain is in control, and the real sensory input students need for learning isn't directed to the PFC (Raz & Buhle, 2006). If this stress persists, the amygdala is under constant stress and information is blocked from the PFC, as the brain can only focus on survival rather than the content or skills being taught. It’s not that students are not paying attention. They are—but not necessarily to the things we want them to. The response to stress also may produce inappropriate behavioral responses when the brain is in the fight, flight, or freeze survival mode, with students often zoning out or acting out. Their reduced academic success affects their self-confidence and reinforces a fixed mindset and often learned helplessness.

Rather than threat, it is important that novelty, interesting ideas, and curiosity-arousing items—including music and colors—are present in the classroom to stimulate the RAS. Then the “door” to the PFC is open (Wang et al., 2005). Instructional elements like these can be particularly motivating and attention grabbing, allowing students to relax and enjoy learning with very low threat. This environment increases the possibility of “velcroing” information or concepts to the mind and transferring learning into long-term memory.

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**Strategies to Avoid the Stress Response**

Creating a safe, secure, “brain-friendly” classroom environment can maximize student interest, participation, and learning. Here are some ideas for your classroom.
Classroom Norms

Students can often experience “anticipatory anxiety” when they are unsure of the conditions, processes, and expectations for success. Predictable, consistent, and shared procedures for arriving at and starting class, distributing materials, and accomplishing daily routines lower stress and provide a comfortable environment. If we can set up routines and procedures so that the brain does not have to resort to the fight, flight, or freeze response, we will alleviate a lot of stress and distraction. The brain looks for patterns and can use them to move about the room and manage materials, resources, and interactions.

Classroom norms or behaviors related to how the teacher and students work together in the classroom also create a safety net and reduce potential conflict as students work collaboratively. Behavior guidelines for how students work alone, in a group, or as a class will greater ensure a stable environment and contribute to organization and orderliness. Establish procedures for these activities:

- What students do when they come into class
- Who gives out materials
- How and where students hand in assignments
- What to do when students finish their work
- What students can do when they don’t know what to do
- What to do when students need help
- Procedures for how to get into groups
- How students work with others
- How students tidy the classroom and dismissal procedures

These practices all help to free the self-preservation mode in students’ brains, allowing them to engage fully in pursuit of learning. Classroom norms need to be negotiated if students have
ideas or suggestions and should be posted so students can use them as a resource to help develop independence and self-efficacy. The routines need to be demonstrated, practiced, and monitored so that students know them well. These procedures become automatic over time as the brain connections are strengthened through repetition.

**Group Work**

Hallowell (2011) suggests that people need to interact with others daily to satisfy our human biological needs and that evidence indicates that people deprived of this interaction will actually lose brain cells. It is essential that classrooms are true learning communities where everyone has a sense of belonging and feels included. Teachers must foster that community spirit by facilitating collaboration with partners and in small groups focused on rigorous, interesting, appropriately challenging academic tasks with opportunities for developing social skills. There is much more “brain safety” in a small group to share and build on one another’s ideas, admit confusion, and make mistakes than to risk embarrassment in a large group or as a lone voice (Gregory & Kaufeldt, 2012).

**Agendas**

Agendas for the day or period will also give the brain the fore-shadowing it needs to be ready for upcoming activities and tasks that students will encounter. Agendas elicit curiosity and facilitate smooth transitions. Students should also be clear about the goals or standards that are being targeted in the lesson(s) or unit, the tasks expected of them, and the criteria for success (e.g., rubrics), so that they can self-regulate and monitor their learning. Stress is also reduced when students are able to be self-directed and have choices in tasks and “how they show what they know.” The time and encouragement to reflect on personal progress and set goals also gives students a sense of control and autonomy.
Movement

Movement is necessary in the classroom. When we sit, blood “pools” and does not flow to the brain where it is needed. The brain needs 20 percent of the body’s glucose and oxygen, says Daniel Drubach (Drubach, 2000). Moving helps reoxygenate the blood and pump it to the brain. This biological process in itself is a wake-up call. Movement releases feel-good hormones, endorphins, and dopamine; it also lowers the levels of the stress hormones (cortisol and adrenaline). The combined effect reduces stress and helps give a sense of well-being and comfort.

Create reasons for movement by asking students to form a group, move their desks and chairs to work together, or engage in a standing partner dialogue. In the elementary grades, play “Simon Says” or sing a movement song. Brain Gym (Dennison & Dennison, 1992) is a program that involves plenty of movement to pump blood to the brain.

Being cognizant of how brains work and the repercussions of climate and social interactions, we can create a classroom where students feel safe to take risks and make mistakes and know that we are all there to learn. These things lay the foundation for brain friendly learning that will motivate students without controls, punishments, or bribes.
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References


About the Authors

Gayle Gregory is an internationally known consultant who has specialized in brain compatible learning and differentiated instruction and assessment. She presents practical teacher and student-friendly strategies grounded in sound research that educators find easy to use in the classroom or schoolhouse tomorrow. Her interactive style and modeling of strategies help teachers and administrators transfer new ideas with ease.

Gayle has had extensive experience in elementary, middle and secondary schools, community colleges, and universities. She has also had district leadership roles including curriculum coordinator and staff development director. Gayle has worked with Instructional Leadership Teams in many schools and districts throughout the country focusing on data analysis using both formative and summative assessment; and differentiating instruction based on readiness, learning profiles, and interests.

Gayle’s areas of expertise include brain-compatible learning, block scheduling, emotional intelligence, instructional and assessment practices, differentiated instructional strategies, using data to differentiate, literacy, presentation skills, renewal of secondary schools, enhancing teacher quality, coaching and mentoring, managing change, and building professional learning communities.
Gayle is the author and co-author of numerous publications for teachers and administrators.

Martha Kaufeldt is a full-time trainer and consultant with an extensive background in brain-compatible teaching and learning. She has taught at all grade levels, served as a district-level gifted coordinator and staff developer, and most recently was the lead teacher and restructuring coordinator of a demonstration “brain-compatible” school. Martha is a popular trainer and keynoter for individual schools, districts, and institutes, as well as for international educational conferences. She gives motivational presentations and dynamic workshops throughout the United States and Canada that address the fundamentals of brain compatible learning, differentiated instruction, and integrated curriculum for all grade levels.

In 1988, as a staff development planner, Martha codesigned a grant proposal to the David & Lucile Packard Foundation that created a consortium of middle schools interested in restructuring based on brain-compatible models and integrated curriculum programs. Martha served as the program director, trainer and coach for the Bay Area Middle Schools Project. In five years, the project trained and coached more than 300 teachers and administrators to use the strategies that can assist schools in beginning the difficult process of total restructuring. During the 1992–93 school year, Martha returned to the middle school classroom to get a “reality check.” As a 7th grade Humanities Core teacher, Martha was able to work on an interdisciplinary teaching team implementing thematic curriculum, as well as being at a school beginning the restructuring process. As a new challenge Martha then worked for four years as the restructuring coordinator and the lead teacher at an alternative K–6 public elementary school in Santa Cruz, California. This demonstration program emphasizes brain compatible teaching strategies, thematic integrated curriculum, multiage classes, authentic assessment, parent participation, and conflict resolution strategies.