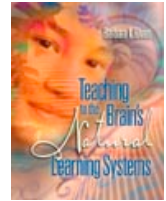


Teaching to the Brain's Natural Learning Systems

by **Barbara K. Given**

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Chapter 7. Theaters of the Mind

Various brain modules process information in parallel fashion throughout each hemisphere and from one hemisphere to the other, not in a step-by-step or serial fashion but—for the most part—simultaneously. For example, imagine sitting in a sunroom on a cool, crisp, bright day, reading a book. Even though your visual system is focused on printed symbols and their meaning, it also processes aspects of the sun's rays reflecting off the crystal pendent swinging in the window. Meanwhile, your auditory system is aware of the neighbor's son bouncing a basketball in the driveway. Smells of new-mown grass penetrate your olfactory system, and feelings in your lower abdomen prompt you to take a toilet break. Each system—and its multiple subsystems—functions like its own minitheater with its own internal movie playing. Thus, information processing resembles a multiplex movie theater where the **brain's** "theaters" never totally close, but remain ever vigilant in some wide-awake or sleepy state (Figure 7.1).

Figure 7.1. Theaters of the Mind



When input from the five major theaters simultaneously stimulates the **brain's** multimodal association areas, focused attention and learning occur. Confused thinking reigns, however, when the different **systems** attend to different "movies." This condition supports Edward de Bono's (1985) contention that the main difficulty of thinking is confusion. According to his research, people try to do too much at once and need to slow down their thinking and focus. That is what we do when we attend primarily to one mental movie or system and its subsystems; however, sounds, sights, and smells from the other **systems** intrude to demand equal attention like freshly popped corn beckoning us to the lobby. For example, intentions to revise a science report (cognitive system) can conflict with feeling the sting of a teacher's sarcasm (emotional system), peer isolation when excluded from a group project (social system), discomfort of a racing heart (physical system), and anxiety at causing parental discord (reflective system). They are all like competing mind movies demanding equal attention.

The emotional, social, and physical learning **systems** tend to be the most powerful in terms of their demands. The level of their functioning determines how effectively the cognitive and reflective **systems** operate. Thus, even in the multiplex theaters of the mind, some movies overpower others. Figures

7.2 and 7.3 show how a lack of balance among the **brain's natural learning systems** negatively affects an individual when any one system either develops at the expense of others or becomes neglected.

Figure 7.2. Personal Effects of Overreliance on One Learning System

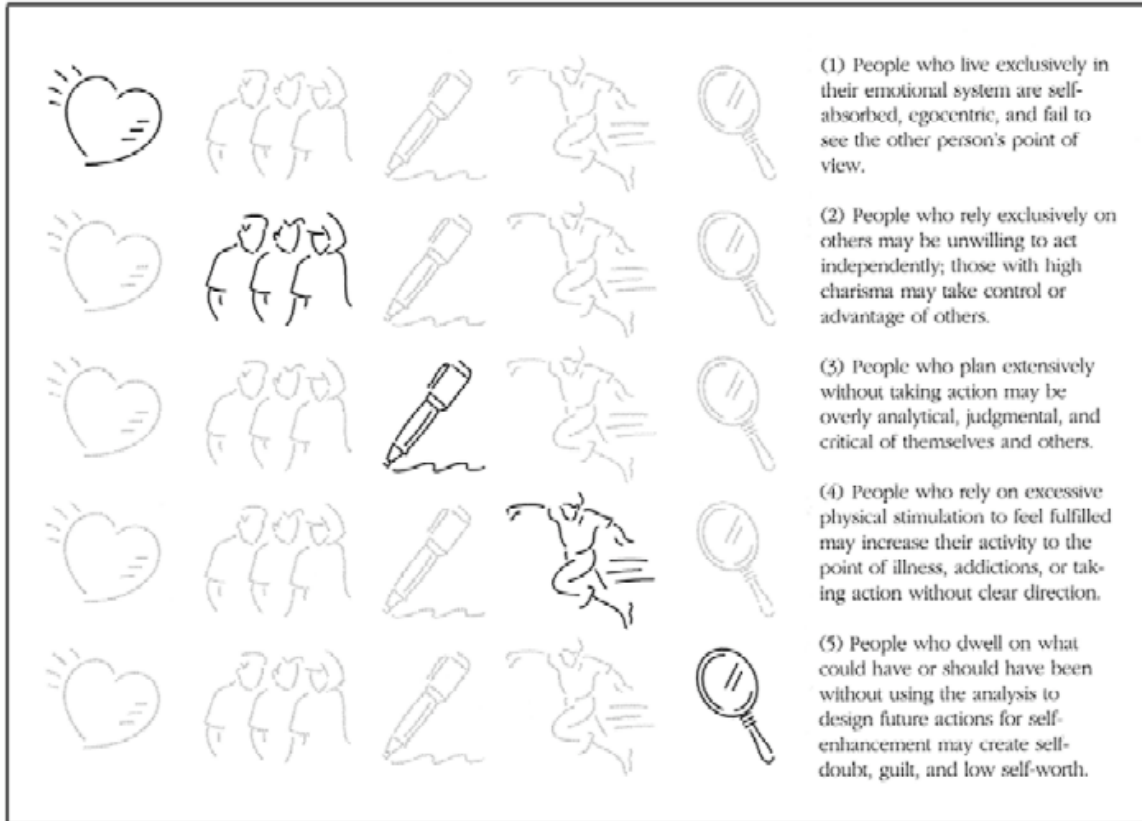
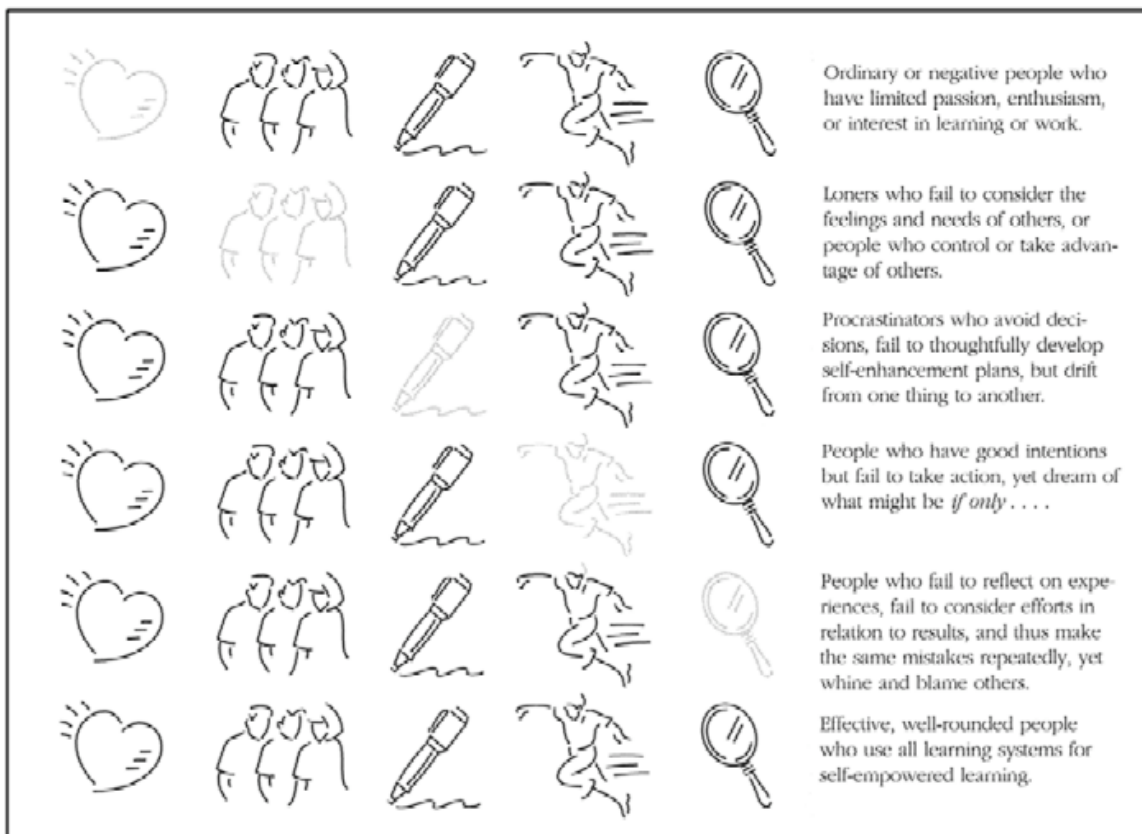


Figure 7.3. Personal Effects When a System is Underdeveloped



Multiply the theaters of one person's mind by the number of students and adults in a classroom, and try to imagine the mental complexities involved. It is staggering! Nonetheless, the five functional operating **systems** serve as a framework for teaching and learning to reduce the overall complexities. We can meet basic psychological needs collectively within a respectful learning environment and honor the individual learning **systems** within the classroom culture.

If teachers develop lesson plans and interact with students by consciously—and daily—addressing the **brain's** major learning **systems** or theaters of the mind, then schools can be a place where students are eager to go and reluctant to leave. By attending to each of the **brain's natural** learning **systems**, teachers and students can develop learning communities with a code of conduct where everyone expects and values achievement, where active learning is the standard. These are classrooms that promote friendships, where students desire group membership, and where each individual strives to achieve her personal best in the pursuit of personal learning goals. Although these standards are idealistic, our extended consciousness allows us to transform these imagined standards into today's classrooms. Why should teachers expect anything less of themselves and their students than to image the best? We must *see what we desire* in our mind's eye so we can convert what we imagine into reality. As an unknown poet once wrote: "You must give birth to your images, for they are future waiting to be born."

Teachers

Most people use the term *teacher*, which comes from Middle English, to mean "one who professes or imparts knowledge or skill." Before we understood that learning involves more than the intake of information, "professing" seemed quite adequate. But today, learning as a process is more akin to socialization than instruction, and it requires teachers who orchestrate development of the major learning **systems** within and across individuals (Ford, 1992).

Throughout this book, I introduced different teacher roles that support each of the learning **systems**: (1) model and mentor, (2) collaborator, (3) facilitator, (4) coach, and (5) talent scout and guide. Nowhere did I recommend the *lecturer* or *professor* role. Although content-oriented minilectures are sometimes appropriate, they should be kept short (10 minutes) or at least interspersed with meaningful student involvement.

If we rethink the term *teacher* as that of model and mentor, collaborator, facilitator, coach, and guide, the descriptions would cast a new light on how teachers view themselves and how they teach students. The process of teaching would focus on forming habits for lifelong learning, rather than just acquiring discrete fragments of information. But student development of agile learning habits throughout the **brain's natural** learning **systems** and teachers shifting from "professing" to more productive roles take concerted effort and time. As Wildman and Niles (1987) point out:

Research on human learning implies that professional growth in teaching has an emerging quality, that the process takes substantial time, and that complex understandings and skills follow developmental patterns that have been understood in psychology for years but rarely applied to the training of teachers. . . . Complex understandings must be constructed

from experience, and because experience can be constructed and reconstructed in many ways, the process is rarely ever finished. (pp. 5–6)

A rose by any other name is still a rose, but rethinking the concept of teaching dramatically alters what happens in the classroom and, consequently, what happens outside of it.

Learning Systems Summary

Just as we possess interconnected physical **systems**, we also maintain five interconnected learning **systems** associated with emotions, relationships, cognition, the senses, and assessment of self in one's environment.

Emotions

In brief, the emotional system determines personal passions, dreams, and desires. It projects a person's spirit, demeanor, and creativity, generating a sense of self that empowers and energizes or depresses and stifles all other **systems**. Emotional learning can be conscious, but it is generally unintentional or unconscious. For example, emotion—especially emotion occurring during critical periods of growth—programs specific reactions in a small almond-sized part of the brain called the amygdala. At the sight of a particular teacher who looks like someone who caused pain or injury in the past, the amygdala triggers physical reactions like anger, and the student feels uncomfortable but does not know why (Alkon, 1992). Emotional learning can also be deliberate, such as when convincing yourself to be genuinely happy for a friend who got the job you wanted.

Relationships

Social learning can also be either automatic or intentional. For instance, toddlers learn a language or develop prejudices and beliefs from family members automatically or without conscious effort. When peers work together to solve a problem, social learning becomes intentional and collaborative.

With the help of relationships, the social system governs interactions and communications with the self and others. It dictates what language develops, fosters collaborative problem solving, and honors individual diversity. The social system thrives on acceptance, love, and belonging.

Cognition

The cognitive system interprets, stores, and retrieves information; deliberately focuses on information; and intentionally provides input for all other **systems**. This system functions best when a person feels safe and secure rather than threatened. Cognitive learning is generally explicit—that is, intentional and purposeful (like much “school” learning)—however, it is also subject to implicit input from other **systems**.

For example, even though you may go to the library and research various car models and decide which one to purchase based on the model's maintenance record and gas mileage, a car salesman may say something to convince you differently by tapping into your emotional or social **systems**. While showing you a car of lower standards, for example, he may say, “I can see you are a lot like me; you are thoughtful and deliberate in your purchases. That makes my job of selling you this car much easier.”

The implicit desired response is, “This salesman really respects me. He wouldn't sell me a car with lower standards than I desire.” Thus, although your cognitive intent is to purchase based only on researched qualities, the salesman's expertise at triggering your emotional and social **systems** may result in a purchase you later regret (Cialdini, 1984).

The Senses

The cognitive system gathers information through the senses, interprets it, and distributes it throughout the brain and body. The physical system is responsible for transforming those interpretations into action. The physical system also responds directly to stimulation on an automatic level as well as a thoughtful level. Physical learning may take a long time to accomplish, such as when learning to ride a bicycle, but once learned, you can jump on one and ride down the street after years away from the trusty two-wheeler. In addition, physical learning can be reactive like the other **systems**. For example, children who grow up with lots of hugs tend to become *automatic* huggers. Those who grow up with physical abuse tend to become abusive.

The Self

The previous four **systems**—emotional, social, cognitive, and physical—operate within an environmental context to provide verbal and nonverbal learning opportunities for reflective learning. Because factors within specific environments and different circumstances vary, the reflective learning system acts as an ongoing monitoring mechanism for the individual. Reflective learning can be purposeful or automatic, unintentional, and unconscious. It is purposeful when the individual reflects: “Under these circumstances, in this environment, how am I doing? What do I need to do to increase my learning?”

Reflective learning weighs past, present, and probable thoughts and behaviors, and then predicts future outcomes by asking self-directed questions. This monitoring system plays a key role in determining how people function in society and how they construct their lives. It is automatic when elements or events in the environment influence learning without one's awareness; reactions occur without thought as to why or what to do about them. I once heard an inspirational speaker say that most people are *unconscious* most of the time, because they move through their days and nights on automatic pilot based on previously learned behavior. Bringing those kinds of behaviors to one's awareness and reflecting on them is part of the reflective learning system's function.

Learning **systems** are dynamical. They are active. They are constantly adjusting and adapting. And once adjusted, the new learning is irreversible.

There is no way to go back and unlearn something. The learning may be forgotten, but it cannot be unlearned. Try unlearning how to tie a shoe or unlearn that President John F. Kennedy was shot in Dallas. It can't be done; thus learning **systems** are qualitatively and quantitatively different as a result of experience.

Educational Considerations

Educators can address the interplay among the learning **systems** by using them as a mental framework for planning lessons and instruction. Figure 7.4 provides a visual representation of possible **implications** of the learning **systems** and how educators can use them to guide their own teaching and students' learning development.

Figure 7.4. Educational Implications of the Brain's Natural Learning Systems

The Brain's Natural Learning Systems	Learning Goal	Basic Learning Needs	Driving Behavior	Self-Directed Questions	Healthy Development of This System	Desired Teacher Behavior	Result of Over-reliance on This System	Result of Under-development of This System
Emotional	Self-direction	Need to be me	Passion	<i>Are my hopes, dreams, and desires for my highest good?</i>	Self-Empowered Learning: Develops a passion for achieving personal goals	Mentor model	Self-absorbed. Egocentric, selfish	Slug. Lethargic; lacks self-direction & motivation. Acts helpless
Social	Self-assurance	Need to belong	<i>Vision and Collaboration</i>	Is my vision clear and socially responsible?	Collaborative Learning: Interacts with others to develop a clear vision of goal attainment	Collaborator	Overly Dependent. Limited leadership skills or unhealthy control of others	Isolate. Fails to consider emotions & needs of others; antisocial.
Cognitive	Self-regulation	Need to know	Intention	<i>What knowledge and skills do I need? Am I planning effectively?</i>	Strategic Learning: Identifies needed know-ledge and skills for goal attainment and develops plans for achieving them	Facilitator	Fault-Finding. Overly analytic; sees own approaches as only correct ones; nit-picks at others	Aimless Drifter. Procrastinates; develops limited knowledge & skills; avoids decisions.
Physical	Self-control	Need to do	Action	<i>Am I implementing my plan?</i>	Active Learning: Takes healthy action for goal attainment and self- systems management	Coach	Physically Absorbed. Excessive dependence on physical stimulation	Dreamer. Takes limited action toward goal attainment.
Reflective	Self-assessment	Need to experiment & explore	Reflection	<i>Am I making steady progress toward my goals? Do my actions match my</i>	Reflective Learning: Self-analyzes actions, attitudes, and accomplishments followed by	Talent Scout Guide	Self-doubting. Filled with guilt; dwells on own "mistakes"; fails to use them for continued progress	Whiner. Blames others for own failings.

				values?	predicting and anticipating the future			
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Lesson plan development begins by determining what students need to know or be able to do (cognitive system). A board of education often makes this decision, which becomes articulated in the local or state standards of learning that identify the desired knowledge and skills. In other words, the standards build the foundation for evaluating knowledge and skill development. The next step is to brainstorm numerous ways to do the following:

1. Tap into students' personal goals and make the lessons personally relevant (emotional learning system).
2. Provide authentic solo, tandem, small-group, and teacher/student learning experiences that promote acceptance of diversity and generate a sense of belonging (social learning system).
3. Facilitate intentional learning for knowledge and skill construction through authentic problem-solving challenges (cognitive learning system).
4. Create active involvement through meaningful projects (physical learning system).
5. Teach students to analyze their progress, consider ways to enhance it, and develop plans for continued growth (reflective learning system).

These plans create a *passion* for learning, a *vision* of what is possible through *collaboration*, and a deliberate plan of *intention* supported by consistent and meaningful action and *reflection*. They address students' *need to be* ("I gotta be me!"), *need to belong*, *need to know*, *need to do*, and *need to experience and explore*.

Once the brainstorming for each system is exhausted, keep the resultant lists in a safe place for later use with subsequent units. Determine how much time is available for each unit of study and begin dividing the information into time segments in terms of weeks. Once you determine which content you intend to teach each week of the unit, use the lists to determine what each day will include, then divide the days into time units, and—toward the end of planning—into minutes for each part of the lesson.

Usually, a human interest story, related riddle, short video, or some other enjoyable way to tap into what students already know helps them connect personally to the topic. This is a good way to begin a new study or review something in progress or completed.

Remember also that when you provide experiences to students, you need to allow them to engage each major learning system and sensory modality without forcing them to use one that feels unnatural and uncomfortable. When you make various experiences available to students, they may try alternative ways of learning once they see others enjoying the experience, thereby tapping into their preferred learning styles and experimenting with other styles (Dunn & Dunn, 1992, 1993).

For example, material for students to read may be:

- tape recorded for those who prefer listening to the information,
- blocked into segments for tandem reading for those who work best with another person,
- presented with a list of questions for those who like focused reading,
- entered into a computer-driven program that highlights the text as it pronounces the words (such as with the Kurtzwell 3000 program),
- read within a small group where it can be discussed.

In a conference presentation, Marie Carbo, a reading specialist and learning-styles advocate, suggested that students who like to move may read while peddling a stationary bicycle with the book resting on a handlebar shelf. Rita and Kenneth Dunn (1992) suggest that children may be allowed to stand, walk, sway, sit, or lie on the floor while reading. The major stipulation of developing a learning-styles classroom is that students may use a specific accommodation if it does not interfere with the learning of others and if the student's performance is as good as or better than previous performance.

This brief overview of lesson development assumes that teachers reading this book have a basic pedagogical knowledge from which to draw. That background should be enough to experiment with teaching to the **brain's natural learning systems**. Without question, however, developing new teaching skills will take work, enthusiasm, and a determination to grow in one's chosen profession.

Summary

Three themes flow through this book. The first pertains to the brain-body's neurobiological operating **systems** for emotions, social interactions, cognitive functioning, physiological learning, and reflective insights. The second deals with environmental influences on those same **systems**; the third refers to the self-constructive nature of thinking and learning that controls and manipulates emotions, interactions, cognitions, behaviors, and reflective thought. From a rich mix of these three themes, I identify five major learning **systems**—emotional, social, cognitive, physical, and reflective—that can be used extensively as a framework for curriculum design and generic lesson planning, as well as a precursor for teaching to individual learning styles.

Because we, as humans, have five functional learning **systems** operating in specialized but parallel ways, we can mold ourselves into totally different

human beings. We are not only conscious of things via our cognitive system, but also conscious of how we feel about them; therefore, it is reasonable to assume that we have a modular system concerned with emotion that is parallel to our cognitive system (Restak, 1994). By the same token, we are conscious of our culture and our preferences for working with partners and colleagues; we also know when we want to work alone. We are conscious of being active and engaged learners, and we know when we are passive and uninvolved in the learning process. We reflect on our past experiences and plan for the future. We develop strategies to help us learn, and we think about our own thinking. We do all these things while our **natural learning systems** address basic psychological needs unique to the human mind. When those needs are met, the **systems** function effectively. When our basic psychological needs go unmet, one or more of the **systems** are less than effective. Teachers can attend to the mind's psychological needs when they know what roles to play and what needs to address.

The neurobiological **systems** function in parallel like five theaters of the mind—all vying for attention. Teachers must respond in some meaningful and individually determined way to each of them. Not only must they accomplish this amazing feat for themselves, but they must also help students put their own learning **systems** together in personally satisfying, socially appropriate configurations. In other words, educators are in the business of brain construction: How we develop and implement lesson plans will determine—in large measure—what kinds of minds our students construct. The key to effective brain construction may be how teachers use the **natural learning systems** as a framework for linking neuroscience and education.

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