

# EDUCATING WITH THE **BRAIN** IN MIND

**I**n my 20 years of teaching, I have seen many changes in education, but none has altered my thinking and teaching practices as much as brain-based research. During the past decade, magazines, journals, books, and the electronic media have reported the results of research that helps us better understand how the brain works.

Eric Jensen, author of the best-seller, *Teaching With the Brain in Mind*, suggests that changes in education will soon result from applications of the new research. He further claims that given the right stimulation and enrichment, "students of all backgrounds and ages, with every imaginable history of failure, and with lifelong discouraged attitudes, can and have succeeded" with brain-compatible learning.<sup>1</sup> Jensen says that teachers need to understand the brain and how it learns so that they can better allocate educational resources and improve children's opportunities for success.<sup>2</sup>

Throughout my career as an educator, I have sought ways to help every student in my care to reach his or her potential. Combining Howard Gardner's theory of multiple intelligences,<sup>3</sup> Marian Diamond's research on enriched environments,<sup>4</sup> Jensen's recommendations, and the basics of good teaching gained from experience in the classroom builds a strong framework for effective teaching.

Because brain-based learning theory has had such a significant impact on my teaching, I want to share what I have learned, in the hope that it will help other teachers. As Jensen suggests,

**Eric Jensen . . . claims that given the right stimulation and enrichment, "students of all backgrounds and ages, with every imaginable history of failure, and with lifelong discouraged attitudes, can and have succeeded" with brain-compatible learning.**

"educators have a significant moral and ethical responsibility for enhancing or limiting the lifetime potential of a human being."<sup>5</sup>

#### Where Do We Begin?

In order to develop its full potential, every human brain needs the stimulation of an enriched environment. Pat Wolfe and Ron Brandt write that "the environment in which a brain operates determines to a large degree the functioning ability of that brain."<sup>6</sup> According to Jensen, "the brain can literally grow new connections with environmental stimulation,"<sup>7</sup> and "this plasticity, the ability of the brain to change, means that IQ can change throughout life. . . . We now have information available that can make a difference in everyone's life."<sup>8</sup> However, "our challenge in education is to determine what

makes an enriched classroom environment."<sup>9</sup>

William Greenough, who has studied the effects of enriching environments for more than 20 years, says two things are particularly important in growing a better brain: to make learning challenging with new information or experiences, and to maximize learner feedback.<sup>10</sup> Since what is challenging for one student may not be challenging for another, it is important to engage students in their own learning, allowing options in activities and pacing.

Early in the school year, I tell my students about brain research. I find that they are fascinated with the topic, and able to grasp a little of how neurons function, as well as the importance of growing more dendrite connections between brain cells and not losing existing connections.<sup>11</sup>

I also introduce Gardner's

BY CHRISTINE GOAD

theory of multiple intelligences. My students usually are pleased to learn that they are all smart in different ways, and this helps them recognize and appreciate their own strengths and those of others. By integrating multiple intelligences throughout the curriculum, I give every student the opportunity to excel and to share his or her expertise with the rest of the class.

#### **An Optimum Learning Environment**

For a classroom environment to enhance learning, it must meet students' physical and emotional needs. I have implemented the fol-

or too little humidity triggers stress."<sup>14</sup> In Melbourne, Australia, where our school is located, it is very hot and dry. Although we have no air conditioning, I try to help the children stay as comfortable as possible by using water spray and wet washers. When temperatures rise above 30 degrees Celsius (86 degrees F), I adjust assignments and encourage the children to drink more water.

- **Foster a warm emotional climate.**

"Good teachers who know that emotional climate is critical invest the first few minutes of every class in activities that allow students to get into a positive learning state."<sup>15</sup> However

## **In order to develop its full potential, every human brain needs the stimulation of an enriched environment.**

ment is to remove threats, embarrassment, sarcasm, humiliation, unrealistic deadlines, and other types of negative experiences.<sup>17</sup> As teachers, we need to take "special vigilance to reduce threats" by avoiding unrealistic demands and environmental threats and examining our own behaviors and policies.<sup>18</sup> These include detentions, lowered grades and loss of privileges, crowded conditions, poor student relationships, and lack of resources.

**I**t has taken consistent, determined effort for me to eliminate all threats. No longer do I tell students that I will call their parents if their work is unsatisfactory, or threaten that they will have to stay in at recess or see me after class.

Teachers must address the problems caused by disruptive students who jeopardize the learning of others or cause damage to people and property. However, learning about the development of emotional intelligence has convinced me to respond in ways that show empathy and care, rather than humiliating or labeling a student, which often exacerbates the problem. In a non-threatening way, we need to help students understand the consequences of their actions and clearly communicate the behavior we expect.

At the beginning of each term, we discuss proper behavior and work together to establish guidelines on which everyone agrees. Whenever a student offends during class, he or she is given time out to reflect on the misdemeanor and respond in writing, suggesting possible ways to improve.

- **Foster the development and use of emotional intelligence.** According to Sylvester, "because our emotions may very well be the force behind what we pay attention to, it is crucial that educators understand and deal with emotions first."<sup>19</sup> Jensen declares that "students need to be taught emotional intelligence skills in a repetitive way that makes positive behaviors as automatic as negative ones."<sup>20</sup>

lowing suggestions from Eric Jensen's best-seller, *Teaching With the Brain in Mind* and his article, "How Julie's Brain Learns":<sup>12</sup>

- **Encourage children to drink water frequently.** "Dehydration is a common problem in school classrooms, leading to lethargy and impaired learning."<sup>13</sup> I give every child a bottle of fresh water at the beginning of each term, and I encourage students to drink as often as they like during class. They can refill their containers, without having to ask permission, from jugs of fresh filtered water that we keep in the classroom. Children are delighted with this plan, and regard it as a privilege.

- **Control classroom temperatures.** "The brain's optimal physical environment includes a temperature near 70 degrees [Fahrenheit—23 degrees Celsius] and a humidity level near 70 percent. Too much heat

busy I am, I try to notice each child and speak positively to my students often, knowing that this can have a significant impact on their day.

- **Allow students to have social contact with friends** before expecting them to concentrate on learning tasks. For the first five minutes of every day, I encourage my students to talk with their friends. I find that after social time, they are more willing and able to sit quietly and participate in class activities.

- **Remove threats from the learning environment.** "Excess stress and threat in the school environment may be the single greatest contributor to impaired academic learning."<sup>16</sup> Living with constant threat affects concentration, reasoning, and memory.

Jensen suggests that the starting point in providing an enriched classroom environ-

Because of the critical importance of this area, I have researched the topic at length and have introduced conflict-resolution strategies in my classroom. Students learn communication skills, including eye contact, and are given the necessary support to articulate their feelings when they are distressed. The results have been overwhelmingly positive.

I am also developing teaching strategies that include emotional awareness. A systematic integrated program based upon Daniel Goleman's guidelines<sup>21</sup> has become an important part of our school program. (See box on page 43.)

### Curriculum Content and Instructional Practices

As teachers, we are responsible for everything that happens in our classrooms. Although we have syllabi, guidelines, and competencies that help with planning and preparation, the actual content and how we present it are up to us. Brain-based educational literature suggests using curricular content that enhances children's development as well as effective teaching practices that stimulate learning.

**Language.** According to Diamond, "the more exposure to conversation, books, rhymes, poems, stories, and plays, the more the left hemisphere (in most children) specializes in receiving and producing words, and the thicker grows the speech areas of the cerebral cortex."<sup>22</sup> Students need to be exposed to challenging vocabularies that are modeled and included in the curriculum. Jensen recommends a combination of whole language and phonics instruction.<sup>23</sup>

Most teachers already recognize the importance of language development and use a number of different methods to enhance their instruction. In my classroom, we seize every opportunity to extend and use new vocabulary throughout the curriculum. Every child reads, speaks, and writes every day as part of the literacy program.

• **Reading.** Diamond recommends group reading because children find this activity non-threatening, they enjoy sharing stories with others their own age, and it gives slower readers better models to follow.<sup>24</sup> Guided reading, when children read and discuss the same text in groups, is a valuable and enjoyable way to extend vocabulary. However, to achieve the greatest benefit, a trained teacher's aide is needed to work with the children.

## In order to develop its full potential, every human brain needs the stimulation of an enriched environment.

• **Music and the arts.** Weinberger regards "music and the arts as essential, not optional components of education,"<sup>25</sup> According to Jensen,<sup>26</sup> the arts build concentration, creativity, coordination, self-efficacy, and self-discipline. They facilitate language development, promote social development and personality adjustment, and provide pleasure, which fosters positive attitudes toward school. Other advantages of an arts program: Math and science skills tend to be stronger in students who have a music or an arts background;<sup>27</sup> daily music lessons enhance learning and improve reasoning; and art develops thinking and builds emotive expressiveness and memory.

I have introduced a daily music program in my classroom. Most of my students learn to read music and play the recorder, and the whole class is able to perform well. Every child participates with great enthusiasm, and substantial gains in self-esteem have resulted from their success in this area.

• **Integrate key learning areas.** Ac-

ording to Pat Wolfe, whenever we "experience something new, the brain looks for an existing circuit or network into which the new information will fit."<sup>28</sup> Teachers need to recognize and appreciate that everything is interconnected, so it is possible to use language to learn history and math to teach science.<sup>29</sup> Building connections between topics stimulates interest, motivates children, and makes learning easier.

Using themes to integrate key learning areas is an exciting way to present content and develop necessary skills and competencies. This style of teaching is fully compatible with brain research.

• **Provide challenge, novelty, and feedback.** According to Jensen, challenge is the product of change—new information, new experiences, and problem-solving. Using a variety of strategies and novelty stimulates the brain to be more alert. Feedback needs to be immediate and specific, since this will reduce uncertainty and lower stress responses.<sup>30</sup>

• **Give students choices.** I have found that students respond favorably to having more choices about their learning and being involved in planning activities. However, there are always some who seem to lack interest and motivation. Jensen describes a devastating condition he terms *learned helplessness*, when students "demonstrate nearly complete apathy and persistent passivity."<sup>31</sup> He suggests that these students can be helped by (1)

being offered rich choice experiences, particularly in stressful situations, and (2) being taught stress- and time-management skills. By adjusting location and circumstances, and using emotions and novel classroom strategies, teachers can help these students feel more optimistic about their ability to change their environment and to learn.

Over the years, I have had a small number of passive, apathetic students who did not respond to traditional strategies and seemed unable to focus on anything. I have begun to offer such students an increased range of choices, such as where to work, who to work with, how to complete various assignments (using multiple intelligences), and when to do certain tasks. Meanwhile, I maintain definite expectations, such as requiring assignments to be completed. Because they are in the habit of not working, it takes time and perseverance for such students to reprogram their brains, but as a result of this consistent approach, they are beginning to show more interest in schoolwork and are enjoying greater success.

• **Foster creativity.** Creativity can be enhanced by a walk, music, humor, or storytelling.<sup>32</sup> During creative writing, I play Mozart softly as the children work. They really enjoy

the music, and some students have requested that I play music on other occasions when quiet work is expected.

• **Keep focused lessons short, and allow time for students to reflect and**

**absorb.** According to Jensen, "the brain's ability to stay attentive for extended periods of time is not only rare, but also difficult" and "by making excessive attentional demands on students, teachers can create resentful learn-

## Multiple Intelligences

### Verbal/linguistic—word smart

The capacity to use words effectively—writing, speaking, persuading, remembering information, and explaining.

### Logical/mathematical—logic smart

The ability to use numbers effectively—reasoning, recognizing and solving problems, using logical patterns to categorize, infer, make generalizations, and test hypotheses.

### Musical—music smart

The capacity to perceive, express, transform, or discern musical forms.

### Kinesthetic—body smart

Expertise in using one's body to express ideas and feelings, often goal-oriented, as in the fine motor ability of a sculptor or the flexibility and grace of a dancer.

### Spatial/visual—picture smart

The capacity to perceive the visual world accurately, to transform and recreate visual perceptions.

### Intrapersonal—self-smart

The capacity for self-knowledge—to detect and discern among one's own feelings—and the ability to use that knowledge for personal understanding.

### Interpersonal—people smart

The ability to notice and make distinctions among other individuals, being attuned to their moods, temperaments, and intentions.

## Emotional Intelligence

According to Daniel Goleman, IQ contributes up to 20 percent of a person's success in life, which leaves 80 percent to other factors. In his best-seller, *Emotional Intelligence: Why It Can Matter More Than IQ*, Goleman clearly identifies the dimensions of emotional intelligence:

- **Self-awareness.** Knowing, understanding, and being able to express feelings which is the basis of self-confidence and self-esteem.
- **Managing emotions.** Knowing how to handle upsetting feelings and impulses, which forms the core of emotional intelligence.
- **Empathy.** Being able to recognize the feelings of others through voice tone and body language, as well as verbal communication.
- **Handling relationships.** Being able to communicate, get along well with others and manage emotions, resolve conflicts, and be more sharing, cooperative, and helpful.
- **Motivation.** Having goals, knowing what it takes to reach those goals, and having the persistence to be able to follow through.

Goleman believes that because emotional intelligence abilities "are the essential foundation for all learning," schools must teach children how to recognize and manage their emotions, and teachers should model emotional intelligence in their interactions with students. (Daniel Goleman, *Emotional Intelligence: Why It Can Matter More Than IQ* [London: Bloomsbury Publishing, 1996]).

## For a classroom environment to enhance learning, it must meet students' physical and emotional needs.

ers."<sup>33</sup> He suggests that teachers use close attention sparingly (1) to introduce key ideas and (2) for directions and review, devoting the rest of the class time to having students process the information through projects, group or partner work, research, and other follow-up activities.

Students need some quiet time after new learning in order to internalize the concepts and transfer them to long-term memory.<sup>34</sup> When the work is fairly new or very complex, they will need more time than when reviewing familiar material. Jensen also suggests that directions or instructions should be given in smaller, more interesting chunks. (For instance, 6- to 9-year-olds can cope with only one to three items at a time.) This will increase motivation and keep students from becoming overwhelmed and discouraged.

Because my students have trouble focusing for more than 10 minutes, I set a clock for a time that we agree on, and keep to this schedule when demanding their attention. As a result, the children are far more motivated to listen, and interruptions have been significantly reduced. I use the remainder of the class time for active learning activities. To ensure clarity, I always give written directions for more complex tasks.

- **Use active involvement to improve learning.** According to Diamond, student involvement is a central principle of brain-based learning.<sup>35</sup> Teaching that uses hands-on experiences, active involvement, and role-playing is easier to master and creates longer-lasting memories. Unfortunately, we seem to limit or even eliminate these kinds of learning opportunities as students reach higher levels in school.

- **Review often to reinforce learning.** Teachers should frequently review concepts they want students to remember, since this helps make the neural pathways more efficient.<sup>36</sup> Wolfe and Brandt remind us that "the brain is innately social and collaborative,"<sup>37</sup> so learning is enhanced when students discuss ideas in cooperative groups. School proj-

ects requiring children to collaborate, plan together, and teach one another also help to develop interpersonal intelligence.<sup>38</sup> I have found group work to be a powerful motivator for full student participation, but because it requires social skills, it can be challenging for young children. However, when properly handled, it can help youngsters develop those skills. I give guidelines for participation and monitor student involvement and cooperation, offering help to specific children as needed.

- **Use movements such as stretching or marching to focus attention** when students are sleepy or lacking in energy. This is especially useful after they have been assigned new work or have been listening to lengthy lectures.<sup>39</sup> When my students become restless or drowsy, I send them on a run to various locations around the school, after which they can concentrate much better!

- **Use motor stimulation to improve academic performance.** "Physical activity is essential in promoting normal growth of mental function," according to Kirkendall.<sup>40</sup> The cerebellum, the brain's center of movement, is also involved in memory, attention, and spatial perception. Children who engage in daily physical education and other active pursuits perform better academically, have more positive attitudes toward school, and

are better prepared to respond quickly to challenges.<sup>41</sup>

Exercise also reduces stress, so teachers who include activity in the daily program will have fewer problems with discipline. Jensen suggests integrating movement and exercise throughout the curriculum. Short energizing activities between lessons, ball-tossing games for review, and stretching can be used anytime when students need more oxygen.<sup>42</sup>

Regular breaks have become part of our daily classroom routine. I do not expect my students to concentrate on a task for more than 20 minutes. After times of close concentration, such as mathematics or Bible class, when they have been mostly sitting and listening, we spend time in physical activities inside or out of the classroom, in pairs, in small groups, or as a class.

- **Eliminate external rewards as a motivating strategy.** Jensen quotes research indicating that "short-term rewards can temporarily stimulate simple physical responses, but more complex behaviors are usually impaired, not helped, by rewards." He adds that "students who succeed usually feel good and that's reward enough for most of them."<sup>43</sup>

As teachers come to better understand the brain's own reward system—the production of chemicals that give pleasure from such behaviors as caring and achievement—they

## Brain-based educational literature suggests using curricular content that enhances children's development as well as effective teaching practices that stimulate learning.

will regularly provide these experiences for all students. However, special events, surprises, or gifts given unpredictably are not seen as rewards for motivation, but rather as a celebration of success.

I have eliminated all external rewards from my teaching. I find that students respond well to praise and are learning to develop pride in their achievements, especially when they receive positive feedback from peers.

Pat Wolfe suggests that research can lead to a more complete understanding of how the brain learns and better decisions about how to structure learning environments and instructional practices.<sup>44</sup> As teachers, we can either nurture a better brain or limit students' potential. I have found brain-based learning and multiple intelligences to be a wonderful and exciting way to teach. I truly believe that these practices make a difference and should be part of all teaching. 📧

**Christine Goad** is Curriculum Coordinator and a middle primary classroom teacher at Gilson College in Delahay, Victoria, Australia.

*She recently completed an M.A. degree in Curriculum and Instruction at La Sierra University, in Riverside, California. Her studies included an emphasis on teaching strategies implementing multiple intelligences, emotional intelligence, and brain-based research. For further information, contact her at cbrsig@alpbalink.com.au.*

### REFERENCES

1. Eric Jensen, *Teaching With the Brain in Mind* (Alexandria, Va.: Association for Supervision and Curriculum Development [ASCD], 1998), p. viii. Hereafter abbreviated as Jensen, 1998a.
2. Ibid., p. 7.
3. Howard Gardner, *Frames of Mind, The Theory of Multiple Intelligences* (New York: Basic Books, 1993); \_\_\_\_\_, *Multiple Intelligences: The Theory in Practice* (New York: Basic Books, 1993).
4. See Marian Diamond and Janet Hopson, *Magic Trees of the Mind: How to Nurture Your Child's Intelligence, Creativity, and Healthy Emotions From Birth Through Adolescence* (New York: Penguin Putnam, Inc., 1999).
5. Jensen, 1998a, p. 40.
6. Pat Wolfe and Ron Brandt, "What Do We Know From Brain Research?" *Educational Leadership* 56:3 (November 1998), p. 10.
7. Jensen, 1998a, p. 30.
8. Marilee Sprenger, *Learning and Memory: The*

*Brain in Action* (Alexandria, Va.: ASCD, 1999), p. 100.

9. Pat Wolfe in Marcia D'Arcangelo, "The Brains Behind the Brain," *Educational Leadership* 56:3 (November 1998), p. 22.
10. Cited in Jensen, 1998a, pp. 32, 33.
11. Ibid., pp. 11-13.
12. Eric Jensen, "How Julie's Brain Learns," *Educational Leadership* 56:3 (November 1998), pp. 41-45. Hereafter abbreviated as Jensen, 1998b.
13. Carla Hannaford, cited in Jensen, 1998a, p. 10.
14. Jensen, 1998b, p. 42.
15. Ibid.
16. Jensen, 1998a, p. 52.
17. Ibid., p. 30.
18. Ibid., p. 40.
19. Robert Sylwester, cited by Sprenger, p. 41.
20. Jensen, 1998a, p. 74.
21. Daniel Goleman, *Emotional Intelligence* (New York: Bantam Books, 1995).
22. Diamond and Hopson, pp. 197, 198.
23. Jensen, 1998a, p. 24.
24. Diamond and Hopson, p. 265.
25. Norman N. Weinberger, "The Music in Our Minds," *Educational Leadership* 56:3 (November 1998), pp. 36-40.
26. See Jensen, 1998a, Chapter 4.
27. Jensen, in D'Arcangelo, p. 25.
28. Pat Wolfe, "Revisiting Effective Teaching," *Educational Leadership* 56:3 (November 1998), p. 64.
29. Geoffrey Caine, in D'Arcangelo, p. 24.
30. Jensen, 1998a, Chapter 4.
31. Ibid., p. 57.
32. Ibid., p. 44.
33. Jensen, 1998b, p. 43.
34. Jensen, 1998a, p. 47.
35. Diamond and Hopson, p. 283.
36. Jensen, 1998a, p. 13.
37. Wolfe and Brandt, p. 11.
38. Diamond and Hopson, p. 209.
39. Jensen, 1998a, p. 44.
40. Donald Kirkendall, in J. Pollatschek and F. Hagen, *Smarter, Healthier, Happier* (Boston: International Health, Racquet, and Sportsclub Assn., 1996), p. 2.
41. Ibid., p. 86.
42. See *ibid.*, Chapter 9.
43. Jensen, 1998a, pp. 63, 65.
44. Wolfe, p. 64.