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Teaching the Way the Brain Is: Working Successfully in an Urban Classroom with Children Who Live in Poverty

Abstract

During the past three decades, growing attention has been paid to the idea of mind/brain-based teaching and learning—an exciting approach, rooted in neuroscience research, that proves the interrelatedness of the mind, brain, and body. The purpose of this report is multifold: (a) to explain why mind/brain-based teaching and learning is relevant to children growing up in poverty; (b) to offer a review of the findings in cognitive neuroscience; (c) to offer a review of the findings regarding the effects of poverty on the developing mind/brain; (d) to identify themes emerging from these findings (i.e., research and understanding, communication, multiple intelligences, emotions and climate, patterning); (e) to describe my urban classroom settings and my struggles therein; (f) to share cross-curricular practical strategies that I have applied successfully with children living in poverty that reflect the research and emergent themes; and (g) to offer a summary/conclusion with implications for practice.

Keywords

neuroscience, mind/brain-based pedagogy, children in poverty

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Teaching the Way the Brain Is: Working Successfully in an Urban Classroom with Children Who Live in Poverty

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In order to meet the educational needs of children, teachers need to understand the structure, functions, and interconnectivity of the developing mind/brain. Further, and more specifically, in order to meet the educational needs of children living in poverty, teachers also need to understand the effects of poverty on the developing mind/brain, and perhaps more importantly, strive to understand the dynamics of the child's environment and his or her struggles therein.

The purpose of this report is multifold: (a) explain why mind/brain-based teaching and learning is relevant to children growing up in poverty; (b) offer a review of recent findings in cognitive neuroscience; (c) offer a review of

the findings regarding the effects of poverty on the developing mind/brain; (d) identify themes emerging from these findings; (e) describe my urban classroom settings and the struggles I faced to teach the children at risk in the classroom; (f) share cross-curricular practical strategies that I have applied successfully with children living in poverty that reflect emergent research-based themes; and (g) offer a summary/conclusion with implications for practice.

BACKGROUND

Take a look at Figure 1, a highly magnified image of the human brain. Rather than discrete areas—separate and distinct from one another—we see a meshed webbing. Further, recent research

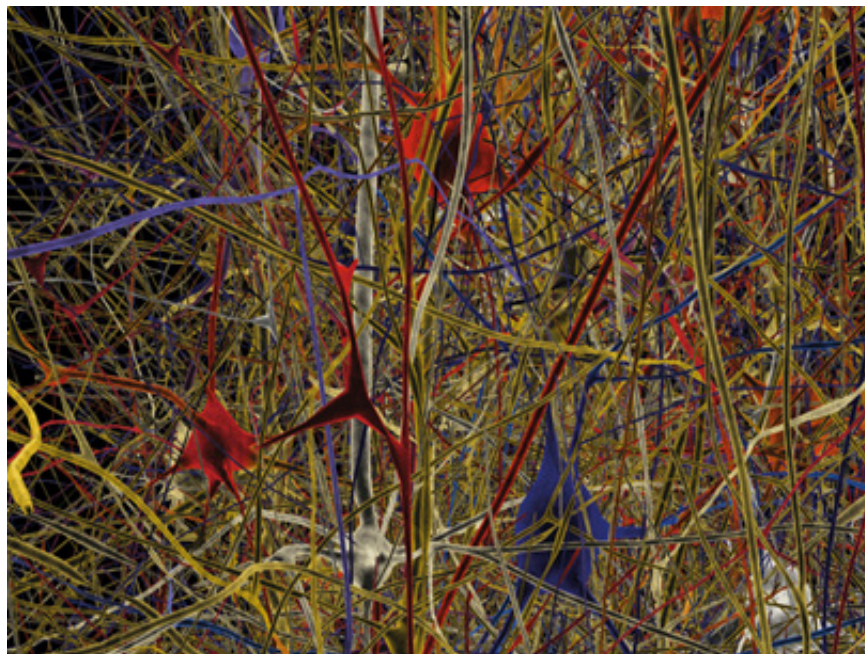


Figure 1. Highly magnified image of the human brain. From “The Human Brain Project: Unraveling the Mysteries of the Mind,” 2013, *WIPO Magazine*, 6, pp. 13–15. Reprinted with permission from Blue Brain Project/EPFL, ©2005–2017. All rights reserved.

studies in cognitive neuroscience (i.e., the study of the brain and nervous system) reveal that these networks are interdependent and coordinate with each other in brain development and function (Caine, Caine, McClintic, & Klimek, 2016; LeDoux, 2015; Society for Neuroscience, 2011; Tokuhamma-Espinosa, 2011; Zimmer, 2011). Accordingly, rather than focusing on individual areas of the brain and their functions, which has been the practice in the past, neuroscientists are now turning their attention to the development and functions of an interrelated brain (Miller, 2011). Jensen (2008) noted that activities in one part of the brain affect activities in another part, and Raznahan et al. (2011) found that areas of the brain communicate with one another and develop simultaneously. Caine et al. (2016) described an organized brain with countless connections between the different areas and hence countless ways of transmitting and integrating signals.

The idea of “connectedness” is reflected also in cognitive theorist Howard Gardner’s (2011) suggestion that the nature of intelligence is multiform. There are at least eight intelligences: linguistic, logical/mathematical, spatial, musical, kinesthetic, interpersonal, intrapersonal, and naturalistic. Superb ability can be found in any one of these intelligences and sometimes in several of them. They should not necessarily be considered discrete, and interactions between these intelligences are critical to the functions of the mind/brain. Additionally, merging and synthesizing these intelligences further illustrate the structure and functions of the brain and serve to stimulate metacognition and creative endeavors (Laplante, 2012).

The interconnectivity of the brain also implies that cognition and emotions are intricately webbed and depend upon overlapping neural systems (Damasio & Carvalho, 2013; LeDoux, 2015). Jensen (2013) described how the whole brain and mind are involved in learning—not just the right or left side—and molecules called peptides scattered throughout the body offer

evidence that emotions strongly influence our thinking. Jensen (2013) also noted an accepting climate and mind/brain-compatible classroom practices (e.g., elimination of threat, goal-setting, activation and engagement of positive emotions, and feedback) offer conditions that stimulate cognition and intrinsic motivation. Rizzolatti and Fogassi (2014) stated that neuroscience research on mirror neurons, or those neurons that “mirror” the behavior of another, has further changed the way humans understand cognition and emotions. Spread across important regions of both sides of the brain, mirror neurons signify the role of emotionality and sociality in learning.

According to Hair, Hanson, Wolfe, and Pollak (2015), the number of children living in poverty is increasing as are the devastating effects of poverty on the developing mind/brain. Specifically, Hair et al. found that the volume of gray matter in children living in poverty was 8%–10% lower than the gray matter of children growing up in middle to upper class families. Jensen (2013) stated that one reason for this is that children living in poverty receive less cognitive stimulation at home than their wealthier peers. Luby et al. (2013) noted that the volume of the hippocampus and amygdala (parts of the brain that react to stress and process emotions) was smaller in children living in poverty. Further, environmental stressors such as unsafe neighborhoods, frequent moves from one home to another and from one school to another, homelessness, hunger, abuse, neglect, and inadequate medical care increase anxiety and hence decrease the ability to learn or to connect with the content being taught (Evans, Brooks-Gunn, & Klebanov, 2011; McEwen, 2011). Jensen (2013) reported that poverty affects children’s brains in several other ways as well. For example, nutritional deficiencies may cause disruptive behaviors, cognitive impairment, and illness.

These findings offer exciting implications for education. According to Caine et al. (2016), we know now that the brain is social, complex,

adaptive, and each brain is unique. The search for meaning is innate rather than learned and occurs through the process of patterning, the perception and creation of parts and wholes simultaneously in the brain. Further, the brain-related ideas regarding patterning support some older and well-respected views. For example, according to John Dewey (1916), experience implies a connection between active and passive doing, and the curriculum is a vehicle for this experience. Dewey believed that integrative, experiential learning is more compatible with the natural inclination of the learner. This means teaching using such strategies as student-selected themes, paired and group learning (Jensen, 2013), and an integrated approach to literacy learning (Tompkins, 2014) can be used to focus instruction (Tokuhamma-Espinosa, 2011).

THEMES FROM THE LITERATURE

Emerging from the literature on the interconnectivity of the human brain and the effects of poverty on the brains of children are several themes which need to be considered by teachers: research and understanding, communication, multiple intelligences, emotions and climate, and patterning.

Research and Understanding

Teachers' lack of a thorough knowledge of brain physiology and the mind/brain-based approach, combined with a lack of understanding of the students they teach, leads to gross misapplication and hence developmentally inappropriate classroom practices. Ill-informed teachers are also less likely to avoid "neuromyths"—simplistic applications of neuroscience findings wherein the original meaning and intent are distorted (Atherton, 2011; McCall, 2012).

It is critical that teachers keep current and continue to adjust their practice to reflect the latest research in the field and not the flashy "bandwagon" passing by (McCall, 2012). They need to merge and then synthesize neuroscience and education research efforts in order to

judge the appropriateness for their children, especially those children who struggle with poverty (LaPlante, 2012; Tokuhamma-Espinosa, 2011). It is also important to understand that the brain, mind, and body are interconnected and work interdependently in perception and decision-making (Society for Neuroscience, 2011; Tokuhamma-Espinosa, 2011; Zimmer, 2011). Keeping current helps insure that teachers remain experts in their area(s) of content, in the ability to interrelate content across the curriculum, and in their knowledge of their students. Willis (2012) stated:

There are no more critical life supports than passionate, informed teachers who can resuscitate students' joyful learning. When educators learn about how the brain appears to process, recognize, remember and transfer information at the level of neural circuits, synapses and neurotransmitters, and when they share that knowledge with students, they share empowerment with their students. Informed teachers help students understand their ability to change their brains and experience success and renewed confidence. Students thrive in classrooms where teachers have the added tools from their neuroscience understanding. The result is nothing less than reigniting the joys of learning, even when they have been extinguished for years. (p. 3)

Communication

The interrelatedness of the mind, brain, and body also leads us to consider the idea of communication. According to Caine, Caine, McClintic, and Klimek (2009), teamwork and dialogue, not just between teachers but among everyone in the school community (i.e., teachers, students, families), reduce isolationism and "downshifting," which according to Caine and Caine (1994) in their classic work, *Making Connections: Teaching and the Human Brain*, is defined as a "psychophysiological response to threat associated with fatigue or perceived

helplessness or both” (pp. 69–70). Therefore, planning, teaching, evaluation, student needs and problems, and ideas are shared. Additionally, McNulty (2016) noted that positive communication between teachers and youth at risk and their families reduces anxiety and establishes trust. This is accomplished by persistence, teachers serving as role models, and maintaining an open door policy.

Multiple Intelligences

According to Gardner (LaPlante, 2012), just as the mind/brain is interconnected and constructs neural networks, students’ learning experiences ought to be contextual and integrated. Rather than being incremental and presented in isolation, instruction ought to reflect the dynamics and “connectedness” in our brains. Further, students’ areas of intelligence (e.g., linguistic, logical/mathematical, spatial, musical, kinesthetic, interpersonal, intrapersonal, and/or naturalistic) need to be integrated and honored equally. Teachers can determine their students’ intelligence(s) via checklists, surveys, and/or observation (Gardner, 2011).

Emotions and Climate

Rather than considering emotions apart from the business of schooling (which has been—and continues to be to a certain extent—the practice of the past), neuroscientists have revealed that emotions and cognition are closely linked (Caine et al., 2016; LeDoux, 2015; Sousa, 2011). Further, according to Damasio (2010), the mind/brain emerges from emotions and feelings. A teacher’s job, first and foremost, is to work with the family and resource personnel to address the child’s needs. Once this is done, and with continued monitoring in a warm accepting classroom climate, then perhaps the child will be motivated to focus on cognitive endeavors. Hughes, Wu, Oi-man, Villarreal, and Johnson (2012) found that less than 10% of children living in poverty experienced positive classroom climates.

Patterning

Emotions (the affective domain) are critical to patterning (the need of humans to organize the parts—patterns—of their known world). Patterning is a natural part of cognitive development or making sense of experiences (similar to Piaget’s assimilation and accommodation). Jensen (2013) stated that when children feel stressed due to physical or emotional threats, the brain loses its ability to create patterns, cognition is negatively affected, and the brain switches to survival mode. When children are nurtured, feel safe, and their cultures are honored and appreciated, their cognition and behavior improve, and self-motivation increases (D’Amico & Rochester, 2015).

CLASSROOM SETTINGS AND STRUGGLES

Before moving into the university classroom, I taught in elementary schools for 35 years. Eighteen of those years were in an urban school in a high poverty, predominantly African-American neighborhood. With the exception of a few years when the school was used as a desegregated magnet school for the “gifted and talented,” student demographics reflected the demographics of the area.

My first year at the school was indeed challenging. It did not take me long to realize that most of my approaches to teaching and learning were not effective—that my students were not responding to traditional methods and materials, most of which were grounded in Anglo-Saxon culture. In other words, I was not “connecting” with my students academically or interpersonally. Almost all of my students were living in abject poverty. Some were homeless and lived in a car, and many arrived at school ill-clothed, hungry, and with behavioral and cognitive deficits. I was reminded over and over of Abraham Maslow’s classic Hierarchy of Needs when I asked myself “how could I expect a child to focus on the concepts of long division and sentence structure, for example, if he or she

was being abused and/or feeling hungry, afraid, and/or unloved?” I recall the child who came to school sick because all he had eaten were potato chips and Kool-Aid; the little girl who came to school on a freezing day in January without a coat and wearing sandals two sizes too small (and no socks); and the child who was scared to get on the school bus because another child would steal his lunch money. He also told me that he would “get a beatin’ when he got home” if his mom found out.

My students would also write in their journals about seeing the “blue flames” coming out of the end of guns in their neighborhoods. Remember Charles Smith, the young man who was shot and killed by police in 2014 (Coleman, 2014)? He was in my third grade class. Then there was eight year old Keith (pseudonym) who came to school smelling of cat urine. We found out that he was raising himself and slept each night with three younger siblings and numerous cats. Not long ago, he appeared on a wanted poster on an electronic billboard. In spite of all the deficits in their lives, Charles and Keith were extremely capable students. It is heartbreaking to know what poverty and wretched environments did to these boys. Each week the *Savannah Morning News* posts pictures of wanted felons, and the faces of my former students appear frequently.

Things were not going well that first year, and then, as part of my doctoral work, I was introduced to mind/brain-based teaching and learning—an exciting and powerful idea that offers hope to those of us who search to find meaning and excellence in *all* spheres of education—for *all* learners. It is an idea that honors long-established cognitive and psychological research findings and also the discoveries in neuroscience (i.e., the study of the brain and nervous system) that prove the interconnectivity of the body, mind (the invisible world of human attitudes and feelings), and the visible, tangible brain (Damasio & Carvalho, 2013; Jensen, 2013; LeDoux, 2015; Tokuhamaspinosa, 2011). With these new understandings,

I began moving away from traditional ways of doing things (e.g., teacher/textbook-centered instruction) to reconstructing my classroom so that it reflected the interrelationship of the mind/brain and non-traditional ways of doing things (e.g., “plugging” the curriculum into the child rather than the child into the curriculum, thematic learning, family involvement, student choice). Approaches to learning, lesson design, application, and assessments became more child-centered and culturally sensitive.

APPLICATION OF MIND/BRAIN-BASED APPROACHES IN THE CLASSROOM

In this section, I describe strategies that reflect the non-traditional, mind/brain-based approaches to teaching and learning used in my classroom. These strategies (developed and “fine-tuned” over time with my children) are organized and defined by the themes discussed earlier in this report. Like the mind and brain, these themes are interrelated and function interdependently; hence, many of the strategies offered are appropriate for more than one theme and more than one area of the curriculum. Just as these themes are interconnected, the purpose here in applying these themes is to connect children to their schooling. Also, it did not take me long to realize that the extent to which these ideas were applied depended largely on the demands of the system, or as Caine et al. (2009) explained, “It is as if educators have to learn to dance at the same time they are also being told to march in step” (p. 2). However, I have found over time that when system personnel witnessed my students’ successes, their support was forthcoming and consistently strong.

Research and Understanding

In addition to my doctoral work, I increased my attendance and presentations at seminars and workshops. I continued to peruse the literature in order to determine the validity of each research effort I examined. My classroom became a democratic one wherein I saw

myself as facilitator and guide for individuals and groups. There was shared interaction and decision-making. The classroom environment and lessons were modified when necessary to meet the needs of my children.

Communication

My students and I began interacting in such activities as construction work, analogies, patterning, and designing and building stage props and costumes. These and other similar “adventures,” such as role playing, manipulation of objects, designing PowerPoint presentations, and working with maps and charts, helped my children sense and verbalize their responses to content. In my classroom, communication meant field trips (e.g., pond studies; tours of water treatment plants, historic sites, and government offices; visits to nursing homes and soup kitchens) which were presented as “connections” to the community. Communication meant cooperative learning groups which enhanced my students’ abilities to work as an interdependent, interactive team, thereby improving their social skills (McCall & Ogletree, 2014).

Communication also means working closely with children and their families. In this way, I broadened my understanding of my children, their culture, and the context in which they lived and played. I found it critical to consider parents as partners in their child’s learning. I made it clear from the beginning that I expected each child’s family to participate with me in their child’s schooling via home visits, phone calls, and/or welcoming notes sent home. The first day of school I sent home an introductory letter describing class routines, procedures, and my expectations for their child. In addition to the school’s open house, I had my own open house, one purpose of which was to explain my approach to learning. I also shared my home phone number and email address with my students’ parents. During the year, I maintained an open door policy. Parent (and grandparent)

volunteers came and helped in the classroom with construction activities, plays, portfolios, etc. I scheduled general parent meetings at least once a month, the purpose of which was to explain special projects and assignments (e.g., research, performances, construction activities, field trips, etc.). I sent a weekly instructional focus form home every Monday explaining the concepts being taught that week. I also sent a detailed weekly report home every Friday explaining the child’s progress that week.

A critical part of communication was the parent/student conference. So starting the first week of school, and in alphabetical order, I would have one or two families in every day after school for progress “checks.” When I got to the end of the class list, I would start over. More frequent contact was necessary if a child was experiencing a problem.

The following conference protocol emerged over time with experience and proved to be highly successful for my students, their parents, and me. First, I learned to be proactive. I did not wait for the parent to call me; I scheduled the appointment at a convenient time for the parent. I made it quite clear that the child was to be included in the meeting (unless there was a sensitive topic to be discussed). Family members were greeted warmly and offered refreshments. I expected family engagement, and I learned to lean in and listen, listen, listen with my body language and my heart. I began and ended each conference with positive comments about the child. Problems (if there were any) were presented as my observations. Materials to be used at home (if necessary) were offered. I also learned to be flexible. If a family member and/or child disagreed with my prescriptive measures, we would compromise until we all agreed on a plan (e.g., a behavioral contract). I learned not to be afraid to admit (and apologize for) mistakes.

Multiple Intelligences

According to Gardner (LaPlante, 2012) children ought to be immersed in an integrated,

interactive, differentiated curriculum which honors each child's culture, interests, experience, and area(s) of intelligence. An approach that reflects Gardner's ideas and one that I used for many years in my urban classroom was child-centered, cross-curricular thematic learning. With this approach, my children decided the unit theme and made many decisions regarding which activities and projects they wished to do. Because of this, motivation was high.

The following procedure for this approach emerged over time: First, I involved my administrators. I received their approval and shared with them recent findings from neuroscience regarding mind/brain-based teaching and learning. I explained to them how I planned to apply these findings in my urban classroom. In my introductory letter to parents and during my first open house, I explained the thematic approach to learning, and I showed PowerPoints of thematic learning activities.

The first week of school the children would choose a theme. (It is critical that the children—not the teacher—choose the theme.) This was accomplished by determining my children's interests and talents via sharing, journal writing, "All About Me" projects, autobiographies, conferencing, interviews, teacher observation, interest inventories, "Index to Ideas" (brainstorming with families on index cards), voting, and dialogue with children and their parents. For example, some of the themes chosen by my students were *Sports*, *Rap*, *The Rain Forest*, *Transistors*, *The Olympics*, *Famous African-Americans*, and *Native Americans*. Once the theme had been decided by my students, I would integrate the curriculum by clustering required standards under the "umbrella" theme. For example, I used science and social studies materials to teach reading. I used art activities (e.g., tessellations) to teach math. I then planned my integrated lessons and gathered materials. I built in plenty of choices into my lessons which reflected equally all areas of intelligence.

Also, during that first week of school, I taught developmentally appropriate research skills. For emergent readers/writers, I modeled reading and writing, using the Language Experience Approach and Sharing the Pen. Pre-literate children also used pictures, discussion, computers, tape recorders, and art work. I guided and facilitated the research process. When research was completed, the children designed and constructed projects that reflected their research. Most of the projects were built with recycled materials (e. g., pieces of wood, fabric scraps, wallpaper, boxes, string, yarn, tubes, wallpaper books, things from nature, etc.) that the parents would contribute.

When questioning and assigning tasks, I focused on the upper levels of Bloom's Revised Taxonomy. For example, "Based on your research of the Woodsmen of Eastern Forests, compare and contrast traditional Seminole and Cherokee shelters (analyzing)." "Critique a piece of non-fiction. Then defend your position in a debate (evaluating)." "Write and perform a rap that explains your group's feelings about bullying (creating)."

In my classroom, there were centers for reading and research, computers, construction activities, etc. that reflected the current theme. There were areas for conferencing, reteaching, and remediation. There were "art carts" for paints, brushes, clay, papier mâché materials, and bins and shelves for art materials. There were shelves and bins for books, books, and more books (reference, trade), many of which came from garage sales and consignment shops.

My classroom was arranged so that students could work in cooperative groups of three or four, and all were able to see and hear me easily when engaged in whole group instruction. Groupings remained flexible; in addition, children were allowed to work by themselves sometimes.

Lastly, we would celebrate! This was done via construction activities, plays, musicals, raps, portfolios, and poetry. Note: When I sensed that

the children were losing interest, or I felt that the topic has been “saturated,” we would begin the process again.

Additional strategies I used which honored children’s varying intelligences were parent, student, and teacher-selected reading materials; process writing, creative writing, journals, and reading response journals; book share on the author’s stool; and listening games, drama, computer interaction, analogies, metaphors, similes, and content area problem-solving.

Emotions and Climate

According to Jensen (2013), helping children to understand and control their emotions is critical to their healthy overall development. Some of the classroom activities I have used to achieve this are presentation and discussion of visual scenarios, role play, skits, charades, painting and sculpting, journaling, reading and reacting to authentic African-American literature, debates, and open mind portraits (Tompkins, 2014) where children put themselves in the place of the main character and discuss and write about the character’s personality, feelings, and experiences.

A mind/brain-based classroom is one that resembles as closely as possible the human mind/brain—interactive, communal, sensory, and with interdependent parts (i.e., participants). I worked to make sure my classroom reflected these ideas as closely as possible. This meant creating an environment where all cultures were given equal attention and respect. Family members came to class to demonstrate weaving techniques and prepare traditional meals. I recall the looks of pride on my children’s faces when grandmom or uncle came to read to the class or share stories of their childhood. Bulletin boards were used to display children’s work. I used colorful materials which were teacher-designed, developmentally appropriate, multicultural, and interactive (“hands-on”). I used natural light and lamplight as I felt that fluorescent lighting was glaring with an audible hum which was irritating

to the central nervous system. I had colleagues and children tell me that the incessant buzzing of the fluorescent lights gave them headaches. I incorporated background music to influence mood. Also, concepts seemed more meaningful to children if singing, dancing, and rap were a part of their learning. As much as possible, the contents in my classroom room were authentic and included things from nature (e.g., a fish tank or plants). I had quiet corners and areas for cooperative groupings and also individual work. In this type of setting my children felt safe and secure (non-threatened), yet challenged to succeed (Jensen, 2013).

Patterning

In addition to providing a child-centered, nurturing, accepting classroom, some of the activities I have used to reduce threat and stimulate patterning were scavenger hunts, frequent periods of recess and rest, background music, movement exercises, and games like Four Corners and Simon Says. Additionally, I challenged my children to find patterns in and outside the classroom in architecture, tessellations, dominoes, works of art, nature (e.g., rocks, leaves, shells, animals), and to create patterns using scrap materials (e.g., buttons, bread tags, pieces of cloth).

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

Recent discoveries in neuroscience are causing educators to question seriously the long held tenets of traditionalism. Rather than teacher-centered, authoritarian approaches to teaching and learning, which have dominated practice for decades, increasing attention is being paid to the idea of mind/brain-based teaching and learning—an exciting non-traditional, child-centered idea that reflects the interrelatedness of the mind, brain, and body.

This report reveals the latest findings in cognitive neuroscience and the latest findings regarding the effects of poverty on a child’s

brain. Several themes emerging from this research and described in this report are research and understanding, communication, multiple intelligences, emotions and climate, and patterning. Strategies that reflect these themes are those that I have used successfully in my own elementary urban classrooms where I struggled to design and implement developmentally appropriate instruction for all of my children.

The research findings and firsthand classroom applications of these findings in this report suggest the following implications for teachers, especially teachers working in high-poverty, urban settings.

- Teacher-researchers need to continue to find ways to improve instruction for children who are living in poverty.
- In order to create successfully a mind/brain-based learning community in today's urban classrooms, teachers need to understand the structure, functions, and the interconnectivity of the developing mind/brain. Further, classrooms need to be structured in ways that reflect the human brain—this means classrooms that are communal, interrelated, and interdependent.
- In order to meet the educational needs of a child living in poverty, teachers need to understand the scourge of poverty and its effects on the developing mind/brain and, perhaps more importantly, strive to understand the dynamics of the child's environment and his or her struggles in this environment.
- The research findings in this report and the emerging themes that reflect these findings may serve as a framework or guide when structuring an urban classroom (or any classroom for that matter).
- It needs to be understood that planning and modifying existent curricula (with

administrative approval) and then developing and implementing culturally sensitive and developmentally appropriate lessons takes time and a lot of hard work. However, the end results—your children's successes—make your efforts all worthwhile.

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