

Brain Research and Its Implications for Early Childhood Programs

A POSITION STATEMENT OF THE
Southern Early Childhood Association

P.O. Box 55930 - Little Rock, AR 72215-5930

1-800-305-7322

gbean@southernearlychildhood.org

What Is Brain Research?

Thanks to new imaging technology used in neurobiology, we can now actually look inside the brains of living children and adults. We can see the brain in action—how it grows, how it acts, and how it reacts. What we are learning is astonishing and is making a major impact on how we view early learning.

Neuroscience research is the study of the working of the brain. Until recently, information about the brain could be obtained only through animal studies or autopsies. Technological advances in the last two decades have given scientists noninvasive tools to use in the study of living brains.

Using these new tools—ultrasound, MRI, PET, and EEG—scientists can study brain function, structure and energy. The information gained through these tools has changed forever the way we view the human capacity for learning. We have broadened our perspective from a psychological base of understanding, which depends on observation, to one that includes a biological, science-driven base of understanding.

What Are We Learning?

The brain is the only organ that is unfinished at birth, but it continues to develop and evolve throughout life. The primary task of the brain in early childhood is the connection of brain cells. Babies are born with 100 billion nerve cells, called neurons. Every neuron has an axon, which sends information out to other neurons, and several dendrites, which receive information from other cells. As axons hook up with dendrites, trillions of connections called synapses are formed.

During the first three years of life an infant's brain will forge an estimated 1,000 trillion synapses. A child's experiences forge the connections of neurons. Neurons that are used will strengthen, and those that are unused will eventually disappear. You might think of this as roads on a map: those that are used become highways, and those that are not used will fade away. According to neuroscientists, sometime near the onset of puberty the brain will prune away all unused or replaced pathways. By late adolescence about half of the 1,000 trillion synapses of the three-year-old will be discarded. The brain will continue this strengthening and pruning process throughout our lives, but it is at its height between birth and puberty.

The quality of experiences and relationships in the first three years of life has a deep and lasting impact on how the brain develops. The richer the environment, the greater

the number of interconnections that are made. The larger the number of interconnections, the faster and more meaningful learning will be. Interactions (relationships) also shape children's brains. During the first year of life, trust develops. Trust is the foundation for all relationships. The more loving and responsive the caregiver is, the greater the foundation for later social interaction.

Experiences and interactions shape children's brains and design the neural architecture that will influence how they will handle all future experiences. If an infant gets too little stimulation, affection, language, and human contact, the development of the brain that depends on those experiences will be deterred or will fail to progress.

SECA's Position on the Research

SECA believes that early childhood practice should be based upon both scientific and anecdotal research. Scientific research provides the basis for development of early childhood environments, practice, curriculum, staffing and training. Anecdotal research keeps us focused on individual differences and on the progress of each child within programs.

SECA supports the findings within the scientific research that document the positive effects of a safe and stimulating environment on early brain development.

Early brain development is contingent on a complex interplay between genes and the environment. We now have a new understanding of just how critical the role of the environment is in enhancing early brain development. The research has provided a plethora of information regarding environmental influences that can make a difference. Scientific research based environments...

- Provide for adequate rest and nutrition. Rest and nutrition influence brain function. Children need daily naps as well as restful sleep at night. The brain uses sleep time to do its housekeeping and to reorganize itself. Children need diets rich in protein (meats, nuts, cheese), fatty acids, and selenium and boron (leafy green vegetables).
- Include a readily available source of water. Thirsty brains can't think. The brain needs water for proper hydration.
- Foster safety for every child. Children learn better in environments where they feel safe. If they must constantly be on guard against danger, they have little ability to focus on other things.
- Utilize materials and equipment supported by research.
- Provide adequate space for motor development, which is at its peak during the preschool years.
- Include plants. Plants increase oxygen. The brain needs oxygen to stay alert.
- Provide stimulation but don't over stimulate. Too much stimulation, i.e., things hanging from the ceiling, walls covered from ceiling to floor and so forth, distracts children.

- Require periodic examination to determine that they are in concert with what we are learning through the research.

SECA believes curriculum design should be informed by research.

Experience is the architect of the brain. In early childhood classrooms we have the opportunity to fashion experiences by choosing curricula that will enhance the wiring of the brain. Science based curriculum...

- Provides lessons that follow the interest of the child. Instruction allows time for both focusing and reflecting.
- Provides activities and experiences that are multi-sensory whenever possible.
- Uses repetition. Brain connections are strengthened and sometimes replaced or expanded by repetition.
- Builds on existing cognitive framework. Intelligence is in large part our ability to see patterns that are similar to our existing understanding and making accommodations for the differences in newly encountered information. Instruction and experiences encourage children to find and build onto existing patterns.
- Includes music and movement. There are a number of research studies that support the value of both music and physical movement. Both help children develop a sense of patterns. Many studies indicate that singing has a number of positive benefits. It helps develop language, reduce anxiety, keeps us feeling happy, and enhances auditory discrimination.
- Uses assessment as a guide. Children learn from experience and practice, but not without some form of feedback. Assessment provides a structure for helping both caregiver and parent to know how and when to provide feedback.

SECA supports the findings within the scientific research that suggest early interactions with significant others affect the wiring of the brain.

Scientific research suggests that children learn in the context of important relationships. Brain cell connections are established as the growing child experiences the surrounding world and forms attachments to parents, families and caregivers. Warm, responsive care appears to have a protective biological function, helping the child weather ordinary stresses and prepare for the adverse effects of later stress or trauma. Non-responsive care, absence of care, drug abuse, and trauma can all have adverse effects on the child's social and emotional health. This research highlights the importance of the relationships formed between children and their caregivers. It suggests the need to pay close attention to both the hiring and the retention of staff. Scientific research based hiring and retention practices...

- Make a commitment to searching for those special people who are patient, talkative, loving, attentive, and happy. They focus on making sure the "heart" is there and commit to teaching the "head." Central to all hiring practices is the belief that the caregivers in our centers are in large part the architects of each child's future.

- Plan for and encourage the retention of staff. There is no profession with more turnover than the childcare profession, and there may be no profession where it is more disruptive and damaging.

SECA believes that quality staff training includes information about the windows of opportunity to promote specific types of learning and applications of that information.

Scientific research indicates that there are certain critical periods that are conducive to developing specific skills. Although learning continues across the life cycle, there are windows of opportunity during which the brain is particularly efficient at specific types of learning. For example, children are receptive to second language learning from birth to ten. Children are particularly in tune with music between the ages three to ten. It is important that staff be trained to use the windows of opportunity. Scientific research based training...

- Makes staff training a high priority in child care centers and schools. Administrators find creative ways of providing release time for training.
- Includes information on child development and the windows of opportunity when planning new employees' training.
- Includes training on the windows of opportunity for existing staff and encourages staff members to share examples they have seen in their classrooms.
- Provides on-going training and follow-up training. Adults learn in the same way children do. We take new information and match it to existing understanding, make adjustments, and then try out the new information. If it still makes sense, we use it. This requires continuous updating and follow-up.
- Finds ways to recognize staff members who seek additional training.

SECA believes that the information that has emerged from the scientific research needs to be accurately and systematically made available to childcare professionals, parents, and legislators, as well as, to the general population as quickly and efficiently as possible.

Just the information that a child's brain is 21 times as active as an adult's alone will make a profound difference on the way early childhood experiences are viewed in this country. After years of scrapping for funding, advocating for appropriate programs, and stating and restating the great significance of early experiences, we finally have scientific proof on our side. We also, however, have a challenge. How do we make sure that this new information is translated appropriately? How do we hold on to what we know is right for children? How do we make the most of this opportunity? Helpful communication involves...

- Inviting parents and families into early childhood classrooms. It's the best way for them to see the application of appropriate practice.
- Holding parent seminars.

- Sending out newsletters and copies of news articles that spread the word about the research.
- Keeping the brain research information in front of the public. Writing letters for local papers. Creating brochures or using this one to help spread the word. Displaying children's artwork in local malls or banks. (Write a sentence or two about how children's drawings and paintings impact their brain development. Do the same thing when you display children's work in your centers or schools.)
- Speaking to civic organizations such as the Rotary, the PTO, the League of Women Voters, and so forth. Many of these groups are eager to help, but they aren't as familiar with the research.
- Including sessions on brain development research in conferences and seminars. It is important that we keep ourselves abreast of the latest research findings. New research emerges daily.
- Using brain research findings, whenever applicable, as support for legislative causes. Help make sure local senators and representatives understand the importance of legislation dealing with young children.

Summary and Conclusions

There will be misinterpretations of the neuroscience information. These misinterpretations are already beginning to surface in television commercials and magazine advertisements. We are bombarded with slogans about products that claim to increase children's brain development. Families are rushing out to buy baby flashcards, to enroll their children in music lessons, and are wondering if they should reorganize their finances to allow mother to stay home.

Public awareness of brain research information has opened a door for early childhood advocates. We have scientific support for what we have claimed as developmentally appropriate practice and an opportunity to increase the number of people on our team. Stay abreast of the new brain research information. Be sure you understand it. Use it to promote the healthy development and learning of every child. Apply the new information to test your current practice and use it to support your work.

The future for young children looks better than it has in decades. We will see additional funding. We will have corporate interest in children's issues. We will see changes in legislation. It's a wonderful window of opportunity for children and their families, as well as, for those of us who are part of the early childhood profession.

[Brain Research Bibliography](#)

[Begley, S. "How to Build a Baby's Brain." Newsweek. Special Edition 1997, 28-32.](#)

[Carnegie Corporation of New York, Starting Points – Meeting the Needs of Our Youngest Children, New York, NY, 1994.](#)

Families and Work Institute. 1996. Rethinking the Brain: New Insights into Early Development. Executive Summary of the Conference on Brain Development in Young Children: New Frontiers for Research, Policy, and Practice, University of Chicago, June.

Handcock L. and P. Wingert. "The New Preschool." Newsweek. Special Edition 1997, 36-37.

Healy, Ph.D., Jane M. You're Child's Growing Mind, Doubleday, New York, NY, 1987, 1984.

Jensen, Eric. Teaching with the Brain in Mind. ASCD, Alexandria, VA, 1998.

Nash, M. "Fertile Minds." Time, February 1997, 48-56.

"Your Child Birth to Three." Newsweek. Special Edition 2000.

Ramey, Craig T. and Sharon L. Right From Birth. Goddard Press, NY, 1999.

Schiller, Pam. Start Smart: Building Brain Power in The Early Years, Gryphon House, Beltsville, MD, Spring, 1999. (1-800-638-0928)

Schiller, P. "Turning Knowledge Into Practice," March/April 1999 issue, Child Care Information Exchange.

Schiller, P. "The Thinking Brain," May, 1998 issue, Child Care Information Exchange.

Schiller, P. "Brain Development Research: Support and Challenges," September, 1997 issue, Child Care Information Exchange.

Sousa, Dr. David A. How the Brain Learns, National Association of Secondary School Principals, Reston, VA, 1995.

Sylwester, Robert, A Celebration of Neurons: An Educator's Guide to the Human Brain, Association for Supervision and Curriculum Development, Alexandria, VA, 1995.

Web Pages

<http://www.iamyourchild.org>

<http://www.zerotothree.org>

<http://www.naeyc.org>

<http://www.nccic.org>

Position Paper Developer

Dr. Pam Schiller, Past President, Southern Early Childhood Association

Reviewers

Dr. George Morrison, Chair, Publications Advisory Committee, SECA

Evelyn Moore (TX), Chair, Public Policy Commission, SECA

Kathi Bush, AL State Representative, SECA Board of Directors

Carole Whitener, VA State Representative, SECA Board of Directors

Beverly Oglesby, FL State Representative, SECA Board of Directors

For information on other SECA Position Statements, call 1-800-305-7322 or visit our website at www.SouthernEarlyChildhood.org.

First Printing, 2001