

Minibibliography

Brain Research and Early Childhood Development: A Selection of Online Resources

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In recent years, research on young children's early brain development has underscored its importance for later development. This minibibliography includes a selection of online resources that discuss some of the latest developments in this field and related educational policy issues. Abstracts come from the source or from ERIC (<http://www.eric.ed.gov>), if in the public domain. Other abstracts were written by NECTAC staff..

Book examines critical periods. (2001, February). *NCEDL Spotlights*, 31. Retrieved April 19, 2006, from <http://www.fpg.unc.edu/~ncedl/pdfs/spot31.pdf>

This newsletter issue provides an overview of the book, "Critical Thinking about Critical Periods," which was the outgrowth of a national working conference sponsored by the National Center for Early Development & Learning (NCEDL). The book is edited by Donald B. Bailey, John T. Bruer, Frank Symons, and Jeff W. Lichtman. It presents a critical discussion of the neural and behavioral sciences that undergird the idea of "windows of opportunity" in early brain development. Experts from the fields of neuroscience, child development, and education discuss what is known and what is not yet known about critical periods. This newsletter lists the book's table of contents, highlights implications for future research, and provides excerpts from the book's final chapter, which reaffirms the importance of appropriate experiences in early childhood.

Bowman, B. T., Donovan, S., & Burns, M. S. (2000). *Eager to learn: Educating our preschoolers*. Retrieved April 19, 2006, from <http://www.nap.edu/books/0309068363/html/>

The Committee on Early Childhood Pedagogy was established in 1997 by the National Research Council to study a broad range of research on early learning and development and to explore the implications for the education and care of children ages 2 to 5, focusing on programs provided outside the home. This book examines the accumulated theory, research, and evaluation literature relevant to early care and education, and presents the Committee's recommendations. It includes the following chapters: (1) Introduction; (2) What Does the Science of Learning Contribute to Early Childhood Pedagogy? (3) The Importance of Individual and Cultural Variations; (4) Pre-school Program Quality; (5) Curriculum and Pedagogy: The What and the How of Early Childhood Education; (6) Assessment in Early Childhood Education; (7) The Preparation of Early Childhood Professionals; (8) Program and Practice Standards; (9) Findings, Conclusions, and Recommendations. Standards for scientific methods are appended.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school* (Exp. ed.). Retrieved April 19, 2006, from <http://www.nap.edu/books/0309070368/html/>

This book examines recent research about the mind, the brain, and the processes of learning. It discusses new findings from many branches of science and their impact on our understanding of what it means to know - from the neural processes that occur during learning to the influence of culture on what people experience and take in. The authors discuss the implications of these findings and suggest ways in which theories and new insights can translate into practice. The book is organized into the following 11 chapters: (1) Learning: From Speculation to Science; (2) How Experts Differ from Novices; (3) Learning and Transfer; (4) How Children Learn; (5) Mind and Brain; (6) The Design of Learning Environments; (7) Effective Teaching: Examples in History, Mathematics, and Science; (8) Teacher Learning; (9) Technology to Support Learning; (10) Conclusions; and (11) Next Steps for Research. Of particular relevance to this minibibliography is Chapter Four, which discusses infant cognition and how young children learn.

Carnegie Corporation. (1994). *Starting points: Meeting the needs of our youngest children*. Retrieved April 19, 2006, from http://www.carnegie.org/starting_points/index.html

This seminal report by the Carnegie Task Force outlines what is known about the requirements for optimal development during the first 3 years of life. It considers ways in which society might reverse the trends toward risk for families and children and describes necessary conditions for families to function well in the interests of their young children. Part I describes “the quiet crisis,” documenting the conditions of children and their families from the prenatal period to age 3 and how the nation neglects children in this age group. Factors contributing to this crisis include poverty, abuse and neglect, changing family structures, and adults’ isolation. Part II discusses starting points for helping young children. These include: promoting responsible parenthood, guaranteeing quality child care choices, ensuring good health and protection, and mobilizing communities to support young children and their families. Part III presents specific recommendations for action.

Education Commission of the States. (2006). *Quick facts: What research shows about the brain*. Retrieved April 19, 2006, from <http://ecs.org/html/IssueSection.asp?issueid=17&s=Quick+Facts>

This resource, prepared by the Education Commission of the States, provides a bulleted list of quick facts taken from a number of recent research reports about the brain. Each fact is followed by a citation for the report from which it was taken.

Education Commission of the States. (2002). *Developmental science and the media: Early brain development*. Retrieved April 19, 2006, from <http://www.ecs.org/clearinghouse/38/91/3891.htm>

This paper provides highlights from an article of the same title that was published in *The American Psychologist* in January 2001. It very briefly summarizes current research on the following themes: (1) The Early Experiences Essential to Brain Development are Largely Unknown; (2) Critical Periods are Exceptional, Not Typical, in Brain Development; (3) Brain Development is Lifelong; and (4) Biological Hazards are Significant Threats to Early Brain Development. It concludes by explaining that the brain is an extremely complex organ and researchers do not yet fully understand what specific experiences are necessary, and when they must take place, for healthy brain development to occur.

Education Commission of the States, & Charles A. Dana Foundation. (1996). *Bridging the gap between neuroscience and education: Summary of a workshop*. Retrieved April 19, 2006, from <http://www.ecs.org/clearinghouse/11/98/1198.htm>

Scientists are continually learning more about how young children's brains develop. At the same time, teachers are looking for effective strategies to help children use their brains to their fullest capacity. Historically, communication between the two groups has been minimal, despite the fact that they might have important information to share with one another. This workshop was designed to bring together noted researchers and practitioners for two days of dialogue and exploration. The questions they explored were: (1) How Can Neuroscience Help Teachers Teach?; (2) How Can Educators Help Guide Brain Research?; (3) How Can Educators and Neuroscientists Continue This Dialogue?; (4) How Can Neuroscientists and Educators Help Shape Policy?

Friedman, D. (2005a). *Interaction and the architecture of the brain*. Retrieved April 19, 2006, from http://www.developingchild.net/papers/020705_interactions_article.pdf

This article describes how early experiences shape the developing brain's architecture and profoundly influence who we become. The author discusses a number of research studies that suggest even our most basic interactions with parents, caregivers and others build and shape brain development in fundamental ways. Science shows us that nurturing, positive interactions release chemicals in a child's brain that promote its growth and development, while negative interactions produce chemicals that weaken its architecture. Recommendations are provided for how these findings can be used to shape public policy around issues such as child care, parental leave, education for young children, and early intervention for children who are living in poverty or otherwise at risk.

Friedman, D. (2005b). *Stress and the architecture of the brain*. Retrieved April 19, 2006, from http://www.developingchild.net/papers/stress_article.pdf

This article examines recent research that demonstrates how stress can weaken or compromise the intricate architecture of a young child's developing brain. Frequent exposure to stress causes the release of harmful chemicals that can impair the brain's physical growth and make it harder for the neurons to form connections with each other. This, in turn, impacts a child's ability to respond positively to future stressors and can have direct and life-long adverse consequences. Conversely, research suggests that favorable conditions can strengthen the developing brain's architecture. In early childhood, the brain is malleable and different experiences can change the developmental trajectory significantly. The author concludes the article by discussing the implications of these findings for public policy and early intervention.

Halfon, N., Shulman, E., & Hochstein, M. (2001). *Brain development in early childhood*. Retrieved April 19, 2006, from <http://www.healthychild.ucla.edu/Publications/Documents/halfon.health.dev.pdf>

This report examines many of the questions legislators, service providers and families have about the science of brain development and how that science can inform the decisions they make for young children. The report reviews recent research on early brain development, examines the extent to which parents are aware of the importance of early childhood experiences for brain development, identifies known risk and protective factors for cognitive and social/emotional development, and describes interventions that have been shown to support development in these areas. It concludes by stating that the following four findings from neurobiology and psychology have important implications for parenting and public policy: (1) a child's brain is immature at birth; (2) it is changed by experience; (3) the timing of experience can be important; and (4) relation-

ships influence a child's social and emotional functioning. The report's two appendices graph the developmental course of human brain development and delineate risk factors and developmental outcomes.

Hawley, T. (2000). *Starting smart: How early experiences affect brain development*. Retrieved April 19, 2006, from <http://www.zerotothree.org/startingsmart.pdf>

Research suggests that brain growth is highly dependent upon children's early experiences. Brain development after birth consists of a process of wiring and rewiring the connections among neurons, which allow communication and coordinated functioning among various brain areas. The forming and breaking of neural connections depends directly on the child's experiences; only those connections and pathways frequently activated are retained. Children who have little opportunity to explore and experiment with their environment may fail to develop fully the neural connections and pathways that facilitate later learning. Further, exposure to trauma or chronic stress can make children more prone to emotional disturbances and less able to learn, because they develop overactive neural pathways that control the fear response. It is possible to influence disadvantaged children's development through early intervention programs, as evidenced by the results of the Abecedarian Project. This paper discusses these findings and provides strategies communities can use to help families promote their children's brain development. Some of these include: (1) educating families about the importance of early experience; (2) preventing abuse and neglect; (3) providing accessible, quality mental health services; and (4) ensuring adequate early nutrition. Childcare providers need training in devising appropriate environments, and parents need information on choosing quality childcare.

National Association of Child Care Resource and Referral Agencies. (n.d.) *Rethinking the Brain*. Retrieved April 19, 2006 from <http://www.childcareaware.org/en/tools/resources/rethinking.html>

This report, prepared by the National Association of Child Care Resource and Referral Agencies, provides a brief summary of research taken from "Rethinking the Brain: New Insights into Early Development," a classic report that was released at the White House Conference on Early Learning in April 1997. It presents a number of key findings from brain research and discusses the implications of these findings for policy and practice.

National Scientific Council on the Developing Child. (2006). *Early exposure to toxic substances damages brain architecture* (Working Paper No. 4). Retrieved June 12, 2006 from <http://www.developingchild.net/papers/toxins.pdf>

Abstract: Toxic substances can disrupt brain development and are especially dangerous when the brain is immature. When the young developing brain is exposed to certain substances, its structural foundation can be compromised, resulting in significant, long-term, adverse outcomes. This paper discusses a wide array of potentially dangerous substances that young children are exposed to, both in utero and in the early years of life. It reviews what the science tells us about the devastating impact these substances can have on early brain development and discusses the implications of these findings for policy and early intervention programs. Also included is a section on popular misunderstandings about this topic, a glossary, and a list of references.

National Scientific Council on the Developing Child. (2005). *Excessive stress disrupts the architecture of the developing brain* (Working Paper No. 3). Retrieved April 19, 2006, from http://www.developingchild.net/papers/excessive_stress.pdf

This paper reviews what the science tells us about the impact of stress on the developing brain and discusses the implications for those who develop and implement policies related to the well

being of young children. It discusses the gap that exists between what we now know about the potentially harmful impacts of stress on the developing brain and what we do to promote effective interventions. A number of public and private actions that can be taken to close this gap are presented.

National Scientific Council on the Developing Child. (2004a). *Children's emotional development is built into the architecture of their brain* (Working Paper No. 2). Retrieved April 19, 2006, from http://www.developingchild.net/papers/emotional_development_is_built.pdf

A growing body of scientific evidence demonstrates that emotional development begins early in life, that it is a critical aspect of the development of overall brain architecture, and that it has enormous consequences over the course of a lifetime. This paper highlights these findings and discusses the far-reaching implications that they have for policy makers and parents.

National Scientific Council on the Developing Child. (2004b). *Young children develop in an environment of relationships* (Working Paper No. 1). Retrieved April 19, 2006, from http://www.developingchild.net/papers/environment_of_relationships.pdf

This paper documents what science tells us about the importance of nurturing and stable relationships to early brain development. Evidence-based implications for those who develop and implement policies that affect the health and well being of young children are discussed, and examples of how we can close the gap between science and practice for our most vulnerable young children are presented.

Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). *From neurons to neighborhoods: The science of early childhood development*. Retrieved April 12, 2006, from <http://books.nap.edu/books/0309069882/html/index.html>

The Committee on Integrating the Science of Early Childhood Development reviewed an extensive, multi-disciplinary, and complex body of research covering the period from before birth to entry into kindergarten. This book is the result of the committee's review. It synthesizes the literature, elaborates on a number of core concepts of development, and offers recommendations for policy and practice. The committee's conclusions and recommendations are grounded in four overarching themes: (1) all children are born wired for feelings and ready to learn; (2) early environments matter, and nurturing relationships are essential; (3) society is changing, and the needs of young children are not being addressed; and (4) interactions among early childhood science, policy, and practice are problematic and demand dramatic rethinking.

Additional Online Resources

Better Brains for Babies - Retrieved April 19, 2006, from <http://www.fcs.uga.edu/ext/bbb/index.php>

Better Brains for Babies (BBB) is a collaboration of state and local, public and private organizations dedicated to promoting awareness and education about the importance of early brain development in the healthy growth and development of infants and young children in Georgia. Includes a [glossary](#) of easy-to-understand definitions of brain development terms used on the Web site.

Brain Wonders - Retrieved April 19, 2006, from <http://www.zerotothree.org/brainwonders/>

This site is designed to provide parents, caregivers and pediatric and family clinicians with meaningful information about early brain development and the relationships between babies and their

parents and caregivers that support intellectual and social-emotional development. Includes a [glossary](#) of terms related to early brain development.

Healthy Minds Handouts from ZERO TO THREE - Retrieved April 19, 2006, from <http://www.zerotothree.org/healthyminds>

This site contains age-specific handouts that summarize take-home messages from “From Neurons to Neighborhoods: The Science of Early Childhood Development,” a report by the National Academy of Sciences. These handouts are free to reproduce and distribute for educational, nonprofit purposes.

National Scientific Council on the Developing Child - Retrieved April 19, 2006, from <http://www.developingchild.net/about.shtml>

The goal of the National Scientific Council on the Developing Child is to enhance the early development of children through the design and implementation of effective public and private policies and programs. The Council believes in the value of sound and accurate science as a foundation for enlightened action. It translates research findings for multiple audiences and identifies evidence-based strategies to guide social policies, professional services, and parenting practices.

Talaris Research Institute - Retrieved April 19, 2006, from <http://www.talaris.org/>

The Talaris Research Institute is dedicated to discovering how children think, feel and learn. Its goal is to connect relevant research findings to practical applications - combining the science of learning with the practice of learning. After careful analysis, the Institute transforms research into useful tools and information for parents, caregivers, educators, healthcare providers, and the corporate community.

*To search the ERIC databases or access the references herein,
see <http://www.nectac.org/chouse/>*



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