Early Childhood Education:
A Synthesis of Best Practices and
Implications for Teaching in Culturally Diverse Settings

A Presentation for the
First Annual Symposium on Language and
Cultural Diversity
Texas Woman's University
Denton, Texas

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ESL

Burkart, Grace Stovall and Sheppard, Ken. A Descriptive Study of Content-ESL Practices. Center for Applied Linguistics. Found at http://www.ncbe.gwu.edu/miscpubs/cal/contentesl/howare.htm

This site contains guides compiled from a three-year study on content-ESL programs. Schools participating in the study had a significant limited English proficient (LEP) population who were engaged in content-ESL in their schools. LEP students received instruction in classes that combined ESL and a content area. For the teacher new to the ESL classroom or who has LEP students mainstreamed into a content class, this site offers answers to many
questions they may have. Content-ESL is an approach that integrates instruction in language and content.

Children learn to talk at an early age and learn how to make language work for them. Culturally induced pre-dispositions can lead to a mismatch between culturally determined expectations and actual classroom practices. Factors such as anxiety, poor motivation stemming from the learner's attitudes toward the target language, and low self-confidence can keep children from using the target language. Learning styles are in part culturally derived.

Findings

Reading. Differences in languages and cultural background can affect text processing and interpretation. For this reason, reading is seen as a meaning-construction process that moves from top down and calls on bottom-up processes only when alternative strategies are blocked. The focus is on comprehension, the construction of new ideas from existing ones, and the use of prior knowledge to support and create new knowledge.

Writing. Writing is viewed as a social process, with writers interacting and learning from each other as they develop texts for real audiences. The interactions may involve discussion, reading, and pre-writing, which lead to the development of drafts and revisions before a final draft is edited and published. In the process students are understood to be at work learning from the process itself. For students learning to write essays in content courses, the use of the graphic organizer has become commonplace.

Mathematics. Mathematics proficiency involves a mastery of the discourse of mathematics as well as a grasp of mathematics concepts. Students from culturally diverse backgrounds may have trouble in mathematics if teachers do not modify their language to match the students' level of proficiency. Mathematics teachers of language minority students have begun to require more instructional conversation around math problems, more group work, and more expository writing.

Boyd, Rossana Ramirez (2000). Attitudes of Teachers of Spanish as a Foreign Language toward Teaching Spanish to Hispanic Students in Urban Schools. An unpublished dissertation.

Findings

In her research Boyd cites a reason that students might persist with negative attitudes toward learning through a second language might be due to their lack of cognitive skills in that language.

She explains that students may fall into one of three thresholds: 1) children who have low levels of competence in both languages with negative cognitive effects, 2) children who have competence in one but not both languages where cognitive effects may be positive or negative, and 3) children who have competence in both languages and their cognitive effects are positive. At level three, children are balanced bilinguals. According to Boyd, students need to be provided with opportunities in both English and their native language since there are social economic, educational, and cognitive benefits to be gained from multilingualism.

Leinaweaver, Jeff (1998). The "Tuning In" Listening Activity. Found at http://www.aitech.ac.jp/~iteslj/

Findings

This is an activity that allows children to practice active listening. Students listen for one specific element in each lesson. This can range from names, animals, colors, verbs, nouns or numbers. In order to conduct this activity the teachers selects a listening sample and develops a word web on a selected language item. Students are allowed to associate words that they hear to fill in the word web. The tape is played twice and as students listen they write down the words that were targeted in the lesson. Discussions follow.

Kelen, Christopher (2000). Perpetual Motion: Keeping the Language Classroom Moving. The Internet TESL Journal, VI, (1). Found at http://www.aitech.ac.jp/~iteslj/

Findings

The panauricon is a teaching method that arranges students in the oral class in a rotating circle allowing them the opportunity to practice conversations with as many different partners as possible. The emphasis of the panauricon is on establishing the teacher in the center position where s/he can hear what any student is saying. The panauricon is a student-centered strategy because it is the students who do most of the talking. In this method, the teacher has an invisible presence. The teacher's role is to listen and intervene in the individual conversations in order to increase oral presentations from students in the target language. One interesting method of organizing the class for conversation on a topic is to create inside-outside circles, where everyone has an inside-circle partner and an outside-circle partner with whom to talk. Ideas such as jigsaw activities, scribes and whisperers, and storytelling could employ panuaricon.

Houston, Hal (1999). 75 ESL Teaching Ideas. The Internet TESL Journal, v (11). Found at http://www.aitech.ac.jp/~iteslj/
Useful ideas are presented, such as coming to class dress differently and have students comment on what's different; explain to students what it means to call someone a certain animal (dog, pig, fox) in English, and then ask them what these mean in their language; or ask students to name as many items as they can in the classroom and write these names on the board.

Rothstein-Fisch, Greenfield, Patricia M. and Trimbull, Elise (1999). Bridging Cultures with Classroom Strategies. Educational Leadership, 56, (7), 64-67.

Findings

The authors advocate for the use of collectivism and individualism in the classroom. Collectivism is a cluster of interrelated values that emphasize the interdependence of family members. Within this value children are taught to be helpful to others and to contribute to the success of any group they belong to—beginning with the family. Knowledge of the physical world is placed in this context. By contrast, schools foster individualism, viewing the child as an individual who should be developing independence and valuing individual achievement. Individualism emphasizes information disengaged from its social context. When collectivistic children encounter individualistic schools, conflicts based on hidden values and assumptions can occur. Bridging Cultures is a research-based professional development program that orients teachers to collectivism as a way of understanding underlying motivation behind specific cultural practices, including those of the school.

Help! They Don't Speak English Starter Kit for Primary Teachers, 3rd Ed. (1998). Eastern Stream center on Resources and Training (ESCORT), Region IV Comprehensive Center at AEL, Region XIV Comprehensive Center/Center for Applied Linguistics.

Findings

1. The help kit is designed to provide mainstream teachers with teaching strategies and materials that benefit all students—particularly LEP Students.
2. The kit provides cultural information to help teachers better understand and appreciate language-minority students and their families.
3. Strategies are introduced to assist teachers with improving the reading and writing abilities of LEP students.
4. Math strategies and exercises, that combine learning basic math with language development activities, are introduced.
5. Provisions for alternative ways of evaluating LEP students are included.

Included in this guide are many useful strategies for teachers. There are sections on cultural differences, acculturation, home language, and basic suggestions for working effectively with LEP students. Copies of the guide may be obtained from

The Eastern Stream Center on Resources and Training (ESCORT)
Bugbee Hall – Room 305
Oneonta, New York 13820
1-800-451-8058

Clements, D. H. (1999). *Concrete Manipulative, Concrete Ideas*. Contemporary Issues in Early Childhood, *1*, (1), 45-52.

Findings

Students who use manipulatives in their mathematics classes usually outperform students who do not; manipulatives also increase scores on retention and problem solving tests. However, the use of manipulatives is no guarantee of success. Students may learn to use manipulatives only in a rote manner, knowing the correct steps, but little else. Students need concrete materials to build meaning initially, but they must reflect on their actions with manipulatives to do so. Good manipulatives are those that are meaningful for the learner, provide control and flexibility to the learner, have characteristics that mirror or are consistent with, cognitive and mathematical structures, and assist the learner in making connections between various pieces and types of knowledge.

Weigal, Heide G. (1998). Kindergarten students' organization of counting in joint counting tasks and the emergence of cooperation, Journal for Research in Mathematics, 29, (2), 203-234.
Findings: The purpose of the study was to investigate and document possibilities for and manifestation of collaborative work with pairs of kindergarten students. The students generated four strategies to organize their counting: counting parts side by side, counting at the same time, taking turns, and counting cooperatively. Working cooperatively required an act of planning to establish a common goal and to project an initial action, and thus required reflecting on past experiences and anticipating future ones. The students' cooperative organization of counting contributed to their cognitive development. It led to heightened awareness of the need to keep track of one's counting acts when counting items of a screened collection (where the number of items are represented by numbers rather than items that can be counted). Watching the partner count afforded an opportunity to relate to the part of the partner's activity and to interpret this activity in reference to the student's own counting experiences. Students' mutual involvement in the partner's counting activities during taking turns can be seen as preparation for more sophisticated social interaction. Working in pairs supported and enhances students' cognitive development and promoted more sophisticated ways of social interaction.

Russell, Susan J. (1999). Mathematical reasoning in the elementary grades. In L. Stiff & F. Curcio (eds.) Developing Mathematical Reasoning in Grades K-12: 1999 Yearbook (pp. 1-12). NCTM: Reston, VA.

Findings

Mathematical reasoning must stand at the center of mathematics learning. The author sites four points about mathematical reasoning:

- It is about development, justification, and use of mathematical generalizations.
- It leads to an interconnected web of mathematical knowledge within the mathematics domain.
- The development of the web of mathematical knowledge is the foundation of "mathematical memory."

- An emphasis of mathematical reasoning in the classroom incorporates the study of flawed or incorrect reasoning as an avenue toward deeper development of mathematical knowledge.

Greenberg, P. (1993). How and why to teach all aspects of preschool and kindergarten math naturally, democratically, and effectively. Young Children, 48, 75-85.
Findings: ECE teachers can integrate math education onto their daily routines by emphasizing the mathematical aspects of play and other components of the curriculum.

Crawford, Michale & Witte, Mary (1998). Strategies for mathematics: Teaching in context. Educational Leadership, 57, (3), 34-38.

Findings

A constructivist mathematics classroom channels student energy into active learning, and ties mathematics to ideas and activities that are of interest to students. Five basic strategies associated with contextual teaching or constructivist practice are relating, experiencing, applying, cooperating, and transferring. Relating ties learning to life experience and provides a natural connection between new information and concepts, which are already known. Experiencing allows students to actively engage with the knowledge or concepts they are learning, rather than simply hearing an explanation. Applying lets students deepen their understanding of concepts through solving realistic problems using the concepts they are studying. Cooperating allows students to pool their knowledge and reevaluate their ideas in the light of the ideas of the other members of the group, and participate in different roles as members of a project team. Transferring allows students to deepen their understanding of a concept by applying it to a novel context or situation.

Mathematical Reasoning

Mathematics is a discipline that deals with abstract entities, and reasoning is the tool for understanding abstraction (Russell, 1999). Very young children are able to reason, albeit at a very informal level. For example students come to school with an idea of a number to represent a quantity, or the quality of roundness for the circle. Teachers must help students think about mathematics, to expand their specific knowledge of mathematical ideas about a number, operations or geometric shapes to generalizations that apply to a set of numbers, operations and geometric shapes.

Reasoning is about making generalizations. Developing and using generalizations happens from the very beginning of mathematical learning in the early grades. When young children use concrete objects to develop and test their mathematical ideas, they are using abstract thinking. When children are able to move from the specific instance to consider the general case, they are doing mathematical reasoning. By way of example, a common activity involving geometry is young children to recognize and name various shapes. Children are taught the names of shapes through experiences with adults, peers, television books and computer games, even before they attend school. These experiences however, may lack depth or may be inaccurate. For example, students may describe rectangles are being long or tall, or may identify only equilateral triangles as triangles. Teachers can introduce geometric concepts by keeping these ideas in mind:

- Emphasize the properties and characteristics of a concept.
- Provide many examples and non-examples even if the child is not ready to specifically name the non-examples.
- Pay close attention to the language used.
- Challenge understanding and broaden generalizations.

Underlying mathematical reasoning is a common set of higher order processes, or metacomponents that are needed to solve mathematical and other kinds of problems. Children cannot solve a problem until the nature of the problem is identified. Having figured out what the problem is, the next step is to identify a strategy to solve it. Mental representation of the problem is important. Whenever children are confronted with mathematical representation, they are being asked to reason by analogy. It requires that they focus on the relational properties of a situation or idea (English, 1999). Students need to figure out how best to use their time, energy and aides (manipulatives, calculators) they have in solving the problem. Then, as students are solving the problem and once they have solved it, they need to evaluate their work (Sternberg, 1999).

A focus on reasoning in the elementary grades requires a continual digging for the general nature of the problem underneath the specific problem itself. Students should not focus on finding individual solutions to individual problems, but on developing a web of generalizations to solve problems (Russell, 1999).

References

English Lynn D. (1999). Reasoning by analogy: A fundamental process in children's mathematical learning. In Lee Stiff & F. Curio, Developing Mathematical Reasoning in Grades K-12. NCTM: Reston, VA.

Oberdorf, Christine D and Taylor-Cox, Jennifer (1999). Shape up! Teaching Children Mathematics, 5, (6), 340-345.

Science

Sprung, Barbara (July 1996). Physics is fun, physics is important, and physics belongs in the early childhood curriculum. Young Children, 29-33.
Findings: In most classrooms, science, particularly physical science is not given equal importance with other subjects in the curriculum. Physical science activities are those that provide opportunities for children to discover the physical properties of objects using a process approach. These activities encourage exploration through the manipulation of familiar objects such as waters and, blocks and rolling things. As a result children gain experience in problem solving, creative thinking, spatial relations, decision making, observation, sorting, categorizing, and estimating, all essential skills needed for success in science at higher grades.

Patton, Mary M. & Kokoski, Teresa M. (July 1996). How good is your early childhood science, mathematics, and technology program? Strategies for extending your curriculum. Young Children, 38-43.

Findings

A visual check of the classroom will determine if it is mathematics, science and technology friendly. After a classroom center is established, the teacher should develop a schedule which would allow for students to fully explore the center using block of time long enough for students to engage in meaning play and exploration of the materials. A few of the themes that teachers might include in the center are life and the environment, the human body and senses, buoyancy, and insects.

Science Literacy

As the world becomes more scientific and technological the future depends on how wisely humans use that science and technology. Yet few citizens are scientifically literate. To change this fact, Project 2061 (AAAS) works to reform K-12 education so that all students are literate in science, mathematics, and technology by the time they graduate from high school. Project 2061, proposes Benchmarks to address the question, "What should all students learn to become science literate?" It asserts that every student should leave school with a good grasp of how science works, a functional knowledge of some of the most import concepts and principles from science, mathematics and technology, and a capacity for scientific ways of thinking.

Science literacy is defined as familiarity with the natural word. It involves:

- understanding key concepts and principles in science;
- capacity for scientific ways of thinking;
- awareness of important ways in which science, mathematics and technology depend on one another;
- understanding about the strengths and limitations of science, mathematics and technology; and
- the ability to use scientific knowledge and ways of thinking for personal and social purposes.

By example Chapter 12 of Benchmarks, Habits of the Mind, K through Grade 2 students should be able to:

- Use hammers, screwdrivers, clamps, rulers, scissors, and hand lenses, and operate ordinary equipment.
- Assemble, describe, take apart and reassemble constructions using interlocking blocks, erector sets and the like.
- Make something out of paper, cardboard, wood, plastic, metal, or existing objects that can actually be used to perform a task.
- Determine the linear dimensions in whole units of objects having straight edges.

References

American Association for the Advancement of Science (AAAS) (1998) Project 2061: Science literacy for a changing future [brochure]. Washington, DC.

American Association for the Advancement of Science (1993). Benchmarks for science literacy: Project 2061. AAAS, (New York: Oxford University Press.

Nelson, George D. (1999). Science literacy for all in the 21st century. Educational Leadership 57, (2), 14-17.

Assessment

Hills, Tynette W. (1997). Critical issue: Assessing young children's progress appropriately {On-line]. Pathways. Available: www.ncrel.org/sdrs/area/issues/students/earlycld/ea500.htm
Findings: Assessment of young children, three to eight years of age, requires understanding that they grow and change rapidly, particularly in their social and emotional development; that they can be easily distracted by assessment procedures; and that they have little or no personal interest in being assessed.

Helm, Judy. H. (1997). Critical issue: Organizing for effective early childhood programs and practices. Pathways. Available: www.ncrel.org/sdrs/areas/issues/students/earlycld/ea100.htm
Findings: The overall effectiveness of an early childhood program is dependent on several factors: quality staff, suitable environment, appropriates grouping practices, consistent schedules, and parent involvement. Decisions about these factors have important ramifications because they affect the child, the family, the classroom and the community.

Katz, Linda G. (1997). A developmental approach to assessment of young children, ERIC Clearinghouse on Elementary and Early Childhood Education [On-line], Available: http://ericeece.org/pubs/digests/

Findings

Children are poor test takers because they are sometimes confused when asked questions that they think the tester must already know the answer to. When testing young children, parents and educators may want to: recognize the limitations of report cards and grades; assess aspects of children's functioning that have real meaning; encourage children to assess their own work; encourage children to assess their own progress; and involve children in evaluating the class community.

Russell, Susan J. (1999). Mathematical reasoning in young children. In Lee Stiff & F. Curcio, Developing Mathematical Reasoning in Grades K-12. NCTM: Reston, VA.
Sternberg, Robert J. (1999). The nature of mathematical reasoning. In Lee Stiff & F. Curcio, Developing Mathematical Reasoning in Grades K-12. NCTM: Reston, VA.

Violence Prevention

Brown, David (1994). Youth violence: Causes and solutions. Thrust for Educational Leadership, 24, 10-14.

Findings

The Association of California School Administrators charged a committee to explore directions needed to reduce violence in schools and communities. The committee found several underlying causes: deteriorating social and economic conditions; exposure to violence in the home, community, and the media; drug and alcohol abuse; and an absence of nonviolent problem solving and conflict-resolution skills. Among the committee's recommendations are the following: disseminate violence prevention curricula, expand collaboration with other agencies, and teach parenting skills to parents of young children.

Guetzloc, Eleanor and Rockwell, Sylvia, (Summer, 1998). Fight, flight, or better choices: Teaching nonviolent responses to young children. Preventing School Failure, 42, 154-9.
Findings: Teachers need to know appropriate interventions for dealing with young children who exhibit violent and antisocial behavior. Young children can be taught to recognize their own physical warning signs and to recognize events that trigger violent acts. Additional effective methods include use of social learning curricula appropriate for children's cognitive and emotional levels and success-oriented instructional strategies for teaching academics.

Hinitz, Blythe and Stomfay-Stitz, Aline (1996). Dream of peace, to dare to stay the violence, to do the work of the peacemaker. Paper presented at the Annual Conference of the Association for Childhood Education International. Available: http://orders.edrs.com/members
Findings: Teachers can serve as peacemakers, using developmentally appropriate practices as a vital part of a peace education curriculum. Effective strategies for creating a "peaceable" classroom include the following: (1) developing a sense of unity, (2) implementing cooperative learning, (3) infusing the theory of multiple intelligences into curriculum, (4) sharing biographies of peacemakers, (5) emphasizing multicultural perspectives, and (6) using children's literature to strengthen communication skills and show nonviolent conflict resolution.

Jackson, Beverly (1997). Creating a climate for healing in a violent society. You Children, 52 68-70.
Findings: Early childhood professionals must recognize their role in helping to create a healing climate conducive to learning. They need to know how to provide a safe environment, especially for young children who have witnessed or experienced violence; in addition, they should foster relationships with individual children and their homes and encourage the development of important social skills that lead to moral development.

Massey, Marilyn (1998). Early Childhood Violence Prevention. ERIC Clearinghouse on Elementary and Early Childhood Education [On-line]. Available: http://orders.edrs.com/members
Findings: Even before a child's birth, violence can have profound effects on his or her life. Chronic exposure to violence adversely affects a child's ability to learn; since cognitive skills are crucial in terms of academic success, coping skills, and resilience, the relationship between violence and learning is significant. Parents, teachers, and other caregivers, can work toward preventing or reducing the damaging effects of violence by (1) providing consistent love and attention, (2) providing adequate supervision and guidance, (3) modeling appropriate behaviors, (4) refraining from hitting children, and (5) exercising consistency with rules and discipline.

Slaby, Ronald (1995). Early Violence Prevention: Tools for Teachers of Young Children. Washington, DC: NAEYC. Findings: This book of fourteen chapters shares proven approaches for handling children's aggression and helping children become assertive, nonviolent problem solvers.

Also included is a list of additional resources in the following areas: curricula and activities, reports and surveys, organizations and community resources, and books and materials for adults and children.

Sylwester , Robert (1999). In search of the roots of adolescent aggression. Educational Leadership, 57, 65-9.

Findings

Information is provided about the brain's response system and the need for educators to understand the biological basis of aggressive behavior. Strategies for reducing aggression include the following: (1) helping young children to develop social and coping skills, (2) reducing the stereotyping that alienates at-risk youth and creating an accepting climate in schools and classrooms, and (3) helping children, using developmentally appropriate practices, to understand, master, and effectively use the power of the brain's dual reflexive/responsive problem/solving system.

Literacy

Britsch, Susan and Meier, Daniel (1999). Building a literacy community: The role of literacy and social practice in early childhood programs. Early Childhood Education Journal, 26 209-15.
Findings: Suggestions are provided for strengthening both urban and rural early childhood programs. Among the suggestions are making greater use of writing and drawing materials in classrooms and examining the assumptions that underlie the concept of readiness in kindergartens the children will attend.

Genisio Margaret and Drecktrah, Mary (1999). Emergent literacy in an early childhood classroom: Center learning to support the child with special needs. Early Childhood Education Journal, 26 225-31.

Findings

Center learning provides an environment that empowers children with special needs. It enables them to actively engage in self-directed learning based on ability and strength; it also facilitates areas of development strongly associated with emergent literacy.

Gregory, Linda and Morrison, Timothy (1998). Lap reading for young at-risk children: Introducing families to books. Early Childhood Education Journal, 26 67-77.
Findings: Parents from a low socioeconomic neighborhood who consistently read to their children helped to produce positive learning results. The children began engaging in higher-level thought processes and improved their ability to use language appropriately.

Hockenberger, Elaine and Goldstein, Howard (1999). Effects of commenting during joint book reading by mothers with low SES. Topics in Early Childhood Special Education, 19, 15-27.
Findings: A study was conducted in which mothers with low socioeconomic status (SES) were taught to comment, while reading to their children, in a way that related story characters and events to the child's own experiences. All of the children became more responsive and many of the children showed improved emergent literacy skills on a standardized measure.

Levin, Diane (1999). Changing needs, changing responses: Rethinking how we teach children. Child Care Information Exchange, 128 46-9.
Findings: More attention must be given to the effects of media culture on young children. Effective media literacy curricula must be developed.

Liang, Poh-hwa and Johnson, James (1999). Using technology to enhance early literacy through play. Computers in the Schools, 15, 55-64.
Findings: Technology mixes well with play and emergent literacy. Educators are excited about computer enhancement for children; however, many also express concerns about ratio of computers-to-children, technology's possible displacement of other important elements in the classroom, and the dangers of teachers' valuing technology as an end in itself.

Snyder, Susan (1997). Developing musical intelligence: Why and how. Early Childhood Education Journal, 24,165-71.
Findings: Music and other arts that evoke emotional responses lead to the development of positive self-concept, social skills, comprehension strategies, listening skills, literacy, and problem solving and critical thinking skills. Early exposure to music is important; education without music is incomplete and indefensible.

Stile. Stephen and Ortiz, Robert (1999). A model for involvement of fathers in literacy development with young, at-risk and exceptional children. Early Childhood Education Journal, 26, 221-4.
Findings: A model is presented that involves fathers in literacy activities with their young children. The model presents the following major approaches: reading books, social interaction, and school involvement.

Brain Research

D'Arcangelo, Marcia (1998). The brains behind the brain. Educational Leadership 5 (3), 20-25. This article is an interview with brain researchers, Marian Diamond, Pat Wolfe, Robert Sylvester, Geoffrey Caine, and Eric Jensen.

Findings

Wolfe - The challenge in education is to determine what makes an enriched environment. We will probably find that it is the interaction of the student's mind with the materials. Diamond - Even though memorization has fallen out of favor as a pedagogical approach, it has its place and repetition helps. Sylvester - The best time to master a skill associated with a system is just when a new system is coming on line in your brain. Language, for example, is very easy for a two or three-year-old to learn. It becomes difficult later on because the systems used for it at that early age are being used for something else later. Caine-Thinking and feeling are connected. We need to help learners create a felt meaning, a sense of relationship with a subject. Jensen - The brain's ability to stay attentive for extended periods of time is not only rare, it is difficult. A great teacher can be so by having children's attention only 20-30% of the time.

Carnegie Foundation, Starting Points: Meeting the needs of our youngest children. Found at http://www.cargenie.org/startingpoints/startpt1.html

Findings

In contrast to all the leading industrialized nations, the United States fails to give adequate importance to the health and education of its youngest children at a time when they could benefit most. Recent brain research has shown that the first three years of a child's life can be most critical in his or her brain development.

Novick, R. and Grimstad, J. (1998). Learning to read and write: A place to start. Portland, Oregon: Northwest Regional Educational Laboratory.
Findings: There are conflicts between research and current education practice. Research shows that the development of future capacity to learn is most crucial during the first years. In practice the first years receive the least attention from the education system. Research shows interactive environments enhance neural connections. In practice, day care centers often pay minimum wage to people who lack training and are responsible for too many children. Research shows that with early intervention, some adverse effects can be reversed or prevented. In practice the education system waits for students to fall behind, then places them in high cost remedial programs.

D'Arcangelo, Marcia (1999). Learning about learning to read. Educational Leadership 57, (3), 26,31.
This article is an interview with Sally Shaywitz, Professor of Pediatrics at the Yale Child Study Center.

Findings

In one study very disabled readers were compared with good readers and the study found a difference in the brain activation patterns of the two groups when the task made increasing demands to break up words into their underlying phonologic structure or sound pattern. Brain activation patterns show the functional organization of the brain for reading — what happens when people have trouble reading, and when the problem occurs. There is a difference in brain activation patterns between good and poor readers. The difference is seen when people carry out phonologically-based tasks. This infers that the area of difficulty – the functional disruption in poor readers, relates to phonologic analysis. This suggests that we focus on phonologic awareness when trying to prevent or remediate the difficulty in pool reading. One of the strongest predictors of who will be good readers is their phonemic awareness. Children who have a biologically based difficulty can learn, but we have to present instruction in a more direct, more intense way over a longer duration. Although phonics is more important for some children than for others, all children can benefit from being taught directly how words can be broken up into smaller units and how letters represent sounds. Research-based interventions supported by the National Institute of Child Health and Human Development are balanced, comprehensive programs that include phonologic awareness, phonics, literature, vocabulary, fluency and comprehension-strategy components.

Jensen, Eric (1998). Emotions and learning. Teaching with the Brain in Mind.
(pp. 71-81). Association for Supervision and Curriculum Development.

This chapter looks at the impact of emotions on the learning process.

Findings

1. According to Joseph LeDoux of New York University, “Emotions drive attention, create meaning, and have their own pathways.”

2. Emotions are generated from biologically automated pathways. They are joy (pleasure), fear, surprise, disgust, anger, and sadness.

3. General feeling states and intense emotions of fear and pleasure take separate biological pathways in the brain. While feelings travel a circuitous, slower route throughout the body, the emotions always take the brain’s “superhighways.” In the mid-brain area, LeDoux (1992) found a bundle of neurons that lead directly from the thalamus to the amygdala. Some information will get emotional priority before measured thinking takes place. Any experience that evokes threat or activates our brain’s pleasure circuits activates specific neurons that respond only to these events. This allows us to become, as Goleman puts it, “emotionally hijacked” by our responses. While our emotional system is acting independently, it is also acting cooperatively with our cortex. For example, a student who gets threatening looks from another student may strike back before even thinking about it. The teacher’s “behavior improvement lecture” after the event does little to change the next “automatic” occurrence of hitting. Students need to be taught emotional intelligence skills in a repetitive way that makes positive behaviors as automatic as negative ones. This point is particularly important because although today’s students do not have saber tooth tigers to fight off, they have equivalent threats. These include fear of embarrassment, being considered a failure by their peers, or getting bullied in the hallway. Their brains have adapted to treat those emotional, psychological, and physical threats as if they were life threatening.

4. Brain chemicals are transmitted not only from the commonly cited axonal-synapsedendrite reaction but also are dispersed to wide areas of the brain. The person who is depressed is often treated with Prozac, a medication that modulates serotonin levels. Caffeine boosts amine levels, which boosts alertness. When one experiences a gut feeling, it is because the same peptides that are released in the brain are also lining the gastrointestinal tract. Emotions affect student behaviors because they create distinct, mind-body states. A state is a moment composed of a specific posture, breathing rate, and chemical balance in the body. The presence or absence of norepinephrine, vasopressin, testosterone, serotonin, progesterone, dopamine, and dozens of other chemicals dramatically alters one’s frame of mind and body. How important are these states? They are all that we have; they are our feelings, desires, memories, and motivations. Educators need to pay attention to this. Teachers who help their students feel good about learning through classroom success, friendships, and celebrations are providing the very things the student brain craves.

5. In addition, we remember that which is most emotionally laden. That happens because all emotional events receive preferential processing (Christianson 1992) and the brain is

over-stimulated when strong emotions are present. Emotions give us a more chemically stimulated brain, which helps us recall things better. The more intense the amygdala arousal, the stronger the imprint (Cahill, Prins, Weber, and McGaugh, 1994), says Goleman (1995). In fact, Larry Squire-- a neurobiologist and memory expert at the University of California at San Diego-says that emotions are so important that they have their own pathways. James McGaugh, a neurobiologist at the University of California at Irvine, and fellow researchers agree. When emotions are suppressed or expressed in inappropriate ways, we get discipline problems. Teachers can purposely engage productive emotions. Good learning does not avoid emotions, it embraces them.

Schweinhart, Lawrence J. & Weikart, David P. (1998). Why curriculum matters in early childhood education (1998). Educational Leadership, 55 (6), 57-60.
This study assesses which of three theoretically distinct preschool curriculum models works best. The models under consideration are Direct Instruction, The High/Scope Curriculum and the traditional Nursery School.

Findings

This study found that young people born in poverty experienced fewer problems and felony arrests if they had attended a preschool program based on child-initiated learning focused broadly on children's development, rather than scripted direct instruction, focused specifically on academics. These findings suggest that the goals of early childhood education should not be limited to academic preparation for school, but should also include helping children make decisions, solve problems and get along with others. Scripted Direct Instruction, touted by some as the surest path to school readiness, may purchase a temporary improvement in academic performance at the cost of missed opportunity for long term improvement in personal and social behavior.

Breur, John T. (1997). A science of learning. The American School Board Journal, 24-27.
Findings: In a learning situation, how we understand and how we remember new material depends crucially on our prior knowledge- on what we know and understand before instruction. Learning is active and constructive because we make sense of what we experience by actively associating it with prior experiences. Cognitive research also shows that there is more to being an expert than acquiring subject matter knowledge. Skilled learners have extensive metacognitive knowledge and skills– knowledge about how their minds work and the ability to monitor and control their mental process. Curriculum should be built around students' pre-instructional understandings. Given what we know about how memory works, in teaching any subject it is useful to try to determine what students know about a subject or topic before instruction begins. The problem solving research tells us that in any subject, students have to acquire and coordinate various pieces of knowledge and diverse skills. Students who are having difficulty may be missing specific crucial understandings. Identifying these specific deficits can help these students proceed on the learning trajectory toward subject matter expertise. In all subjects, metacognitive skills distinguish the able from the less able learners.

Goleman, Daniel (1995). Emotional Intelligence: Why It Can Matter More Than IQ. New York: Bantam Books.

Findings

Emotional intelligence is the bedrock upon which to build other intelligences, and it is more closely connected to lifelong success than IQ. Goleman believes that schools must teach children how to recognize and manage their emotions, and that educators must model emotional intelligence in caring, respectful interactions with children. The brain's regulatory centers for emotional response are among the last parts to become anatomically mature. They continue to grow into adolescence. This is vitally important because we are finding that the repeated emotional lessons of a child's life literally shape the brain circuits for that response. So if a child learns to manage his anger well, or learns to calm or soothe himself, or to be empathetic, he develops a life-long strength. That is why it is so important that we help children develop the skills of emotional intelligence.

Caine, Renate N. & Caine, Geoffrey (1991). Making Connections: Teaching and the Human Brain (pp. 79-88). Alexandria, VA: ASCD.

Findings

1. The brain is a parallel processor.
2. Learning engages the entire physiology.
3. The search for meaning is innate.
4. The search for meaning occurs through "patterning."
5. Emotions are critical to patterning.
6. The brain processes parts and wholes simultaneously.
7. Learning involves both focused attention and peripheral perception.
8. Learning always involves conscious and unconscious processes.
9. We have at least two different types of memory: A spatial memory system and a set of systems for rote learning.
10. We understand and remember best when facts and skills are embedded in natural, spatial memory.
11. Learning is enhanced by challenge and inhibited by threat.
12. Each brain is unique.

Implications for Education: Teaching should be multifaceted to allow all students to express visual, tactile, emotional and auditory preferences. In sum, education needs to facilitate optimal brain functioning.

Begley, Sharon, (1996). Your child's brain. Newsweek, 55-62.
Findings: Optimal opportunities for acquiring certain knowledge and learning certain skills occur during certain ages of the child. Examples follow:

1. Birth to 4 years-logical brain-skills in math and logic.
2. Birth to 10 years-language brain-skills in language learning and literacy.
3. Three to 10 years-musical brain-skills in music and the other arts.