# Whatever It Takes

## EFFECTIVE PRACTICES AND PROGRAMS FOR TEACHING AND RETEACHING



## READING AND MATHEMATICS

Division of Teaching and Learning
Leon County Schools
Tallahassee, Florida

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## REFERENCES

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September 1998

Dear Educator:

Leon County School District, like many school districts, is proceeding on many fronts to improve the opportunities for all students to achieve at high levels. In particular, we are strengthening our instructional programs in reading, writing, and mathematics. A component of this work focuses on students who have not been achieving up to our standards. For these students, in particular, it is critically important that the limited instructional time be used in the most effective ways. We must use strategies that have been proven effective in a remedial or reteaching context. We must look carefully at what we do every day in the classroom, both in our "first teaching" and in reteaching.

This first edition of "Whatever It Takes" is a result of this pressing need to identify principles and practices that are supported by research and have potential for improved results with low-achieving, students. The purpose of this guide is to provide educators with

- knowledge of classroom management strategies when providing for the remedial needs of students.
- knowledge of research-based practices for improving the performance of low-achieving students in reading, writing, and mathematics.
- information on high quality reading, writing, and mathematics resources for diagnosis, monitoring, and targeted remediation of low-achieving students.

This edition (by January 1999) and future editions of this document will be posted on the website of Leon County Schools (www.leon.k12.fl.us). Your input, additional references on effective practices, or general suggestions are valued. Please feel free to e-mail us with your ideas.

Each of you plays an essential role in providing the best experiences for low-achieving students. Through the use of daily practices that consistently deliver better results, we can help all students achieve at high levels.

Sincerely,

/s/ Kristen Ellington, Mathematics Developer
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# Whatever It Takes

*Effective Practices and Programs for Teaching and Reteaching Reading and Mathematics*

# Purpose

The aim is to provide quality research and a sound educational guide for teachers, which supports a variety of programs and methods for remediating skill deficiencies. When provided with effective, meaningful experiences and given enough time, students will become proficient in reading, writing, and mathematics.

## The Good Ones are Not at Home

Ready or not, here they are! In September, 3.6 million youngsters enter school; 25 percent of these children live in poverty; for blacks, the figure is 50 percent, and for Hispanics, 40 percent. Today, out of 80 million households in the nation, 9.5 million are headed by a single female parent, 16 percent of whom are under age 25, 50 percent unemployed, 42 percent living in central cities. In fact, every day in America, 40 teenage girls give birth to their third child. In 1955, 60 percent of households matched the traditional family image of one mother, one father, and two children; today it's 4 percent. The 1950's family is gone. The family today is different, maybe no better or no worse, but different. As Larry Lezotte said, *"The parents are sending us the best kids they have. They are not keeping the good ones at home."*

<div align="right">

Larry A. Strong
"The Best Kids They Have"
*Educational Leadership* February 1989, p. 2.

</div>

# Effective Learning Environment

## Physical Characteristics of the Classroom

- Organize furniture to be flexible for both individual and group work.
- Provide paper and spare pencils.
- Provide authentic (real-world) materials to facilitate learning and understanding.
- Establish learning stations/centers that are relevant to students' needs.
- Display student work. Include work that shows improvement.
- Display visual aids around the room (formulas, writing process, rules, etc.).
- Provide independent workspace as needed.
- Create a *"What we did yesterday"* board.

## Classroom Atmosphere

- Begin each class on a positive note.
- Establish a routine and be consistent.
- Set rules (few and to the point) and establish consequences.
- Establish a rapport with students by developing an atmosphere of trust and respect.
- Promote a student-centered classroom environment.
- Establish, teach, and ensure that realistic academic and social standards are met.
- Create an atmosphere that encourages risk-taking.
- Monitor by moving around the classroom.
- Provide opportunities for students to work effectively in peer and cooperative settings.
- Provide a variety of instructional activities during the class period to accommodate for attention spans (e.g., projects, games, and practice).

## Methods of Motivation

- Establish achievable daily and long term goals.
- Teach students to set personal goals.
- Establish a reward system for behavior and academics.
- Offer genuine praise.
- Acknowledge growth. Measure success in terms of improvement.
- Recognize partial successes through partial credit or a rubric system.
- Have students chart their academic progress.
- Have frequent student-teacher conferences to discuss individual progress.
- Respect students' rights to privacy with regards to grades, progress, and personal matters.
- Utilize prior knowledge to develop new skills.
- Give timely feedback to students on homework, quizzes, tests, and responses.

## Instructional Management Strategies

- Teach to the strengths and remediate the weaknesses.
- Systematically review rules and goals.
- Maintain a balance between individual and group work/activities.
- Teach students organizational skills and time management.
- Address various learning styles/modalities by providing alternative strategies and assignments.

# Reading & Language Arts

# Reading & Language Arts
## How We Teach Students to Read: the "Big Debate"

Although the topic of the best way to teach reading continues to be widely debated, most authorities now agree on several points, including the following:

• There is no single best method or program to teach all students to read.
• There are many learning styles.
• Three or more areas of the brain are involved in learning to read.
• The influence of the teacher and his or her training affects all methods.
• Educators must choose from an amazing array of reading programs, materials and methods.
• The teacher's understanding of the reading and writing process is essential.
• Especially for beginning readers, learning to read and write is very interrelated.

According to Adams (1990) there are four processors (orthographic, phonological, meaning, and context) which interact when students read fluently. Refer to Mercer & Mercer (1998) for a more thorough discussion of this model of the reading process. "When information from one processor is weak, information from the other processors compensates. Given that the capacity of development of the four processors varies among learners and that reading approaches stress different processors, teachers must use a variety of reading approaches to meet the needs of diverse learners" (Mercer & Mercer, 1998. p. 313). This is the essence of the International Reading Association's position statement on beginning reading (issued April, 1998), in which they cite other large-scale studies of reading methods which have shown the need for multiple methods. Besides Mercer & Mercer, these studies include Bond & Dykstra, 1967; Foorman et al., 1998; Hoffman, 1994; and Stallings, 1975.

IRA Director of Research and Policy for the Association, Cathy Roller, states: "For every method studied, some children learned to read very well while others had great difficulty. Therefore, we cannot end the reading wars by prescribing a single method. If all children are to learn to read, we must have well-trained teachers who are familiar with a wide range of methodologies, who are knowledgeable about children's reading development, who have access to a wide range of reading materials, and who are able to teach children using a combination of methods that meets the needs of the children in their care."

Teachers who know they can achieve results because their programs and training have prepared them to teach reading are likely to stay in the profession, experience a high degree of job satisfaction, and rebuild respect for public education.

We sincerely hope that this document assists teachers of Leon County Schools along this journey of helping all students succeed—using *Whatever It Takes!*

# Effective Readers

The Northwest Regional Educational Laboratory (NWREL) has conducted extensive research about teaching reading.  In the research compiled by Dr. Thompson, the following **six traits of an effective reader** were identified:

- **Decoding conventions** (e.g., decoding words, symbols, grammar and punctuation; reading aloud with sentence fluency; recognizing genre and mode; and enhancing the meaning of text through oral fluency).
- **Establishing comprehension** (e.g., establishing plot; selecting main idea; distinguishing between major and minor characters, and between significant and supporting details; describing turning moments, conflicts, and resolution; and creating a purposeful summary).
- **Realizing Context** (e.g., finding vocabulary reflective of the text; describing setting and historical time period; finding evidence of social issues; and realizing cultural overtones).
- **Developing interpretations** (e.g., locating problems, ambiguities and gaps in texts; selecting clues and evidence to analyze problems; revising interpretations with new information; and connecting interpretations to a bigger picture).
- **Integrating for synthesis** (e.g., putting information in order; listing, sorting and outlining information; comparing and contrasting; finding cause and effect; comparing text to personal background experience; and using multiple sources to create an *integrated* analysis).
- **Critiquing for evaluation** (e.g., experimenting with ideas; expressing opinions; raising questions; challenging the text and the author; noting bias and distortion; and distinguishing between fact and opinion).

Thompson believes that "when readers use each of the six traits to complete a thorough comprehension of narrative or informational texts, they are, in essence, reading the lines, reading between the lines, and reading beyond the lines."

The NWREL's Assessment and Evaluation Program provides user-friendly resources, training, and services for educators.  For more information, visit their website at http://www.nwrel.org. The seven keys to a successful reading reform in schools are listed below:

- Identify and define what your building and/or district believes good readers should know and be able to do at various grade levels.
- Use common terminology for reading terms, kindergarten through graduation, to talk about your beliefs, definitions, goals, and standards in respect to reading.
- Establish goals and dream big.
- Develop criteria that will be used to assess student achievement.
- Align your curriculum, kindergarten through graduation, with state and /or local reading standards.
- Develop multiple sources of assessment that reflect your standards.
- Understand that creating a comprehensive plan for reforming reading practices in your building, district, and/or state is an on-going, sustainable effort that will take time.
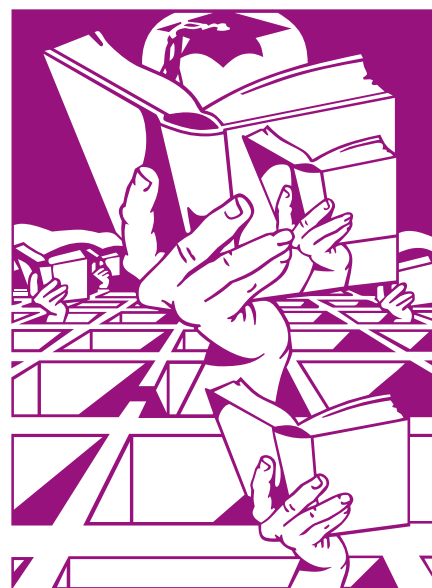
# I.  Concepts of Print

*"What one has not experienced, one will never understand in print."*

—Isadora Duncan

## Definition

Concepts of print is an awareness of how print works and how it looks.  Print, which is made up of letters, corresponds to sounds, words, and text which is read from left to right across the page and from the top to the bottom of the page.

## Research

- Researchers have pointed out that awareness of the forms, functions, and uses of print provides not just the motivation, but the backdrop against which reading and writing may best be learned (Adams, 1990).
- Basic knowledge about print generally appears to serve as the foundation upon which orthographic and phonological skills are built (Adams, 1990).

## Instructional Strategies

- Read to students from trade books and big books and point to the words as you read to practice concepts of print.
- Make sure students realize how individual spoken words correspond to words in print by encouraging the reading of signs and labels in their environment.  Point out similarities and differences in print style.
- Teach the individual letters of the alphabet.  It is not recommended to teach upper and lower case letters simultaneously.
- Make sure students know how books are organized.  Demonstrate that books are read from left to right and top to bottom and teach that the purpose of reading is to gain meaning from the text.
- Begin students' acquisition of a broad sight vocabulary by reading books many times, and using books in which words are repeated.
- Use word walls and word activities for thematic and high frequency words (Fontas & Pinnell, 1998).

## Assessment

- **Concepts About Print**, from ***An Observation Survey of Early Literacy Achievement*** (Clay, 1993) suggests that teachers conduct a five-to-ten minute check to assess what children know about letters, text, and books.

    Some of the important concepts that can be tested easily are: the front of the book, the print (not the picture) tells the story, that there are letters, and clusters of letters called words, that there are first letters and last letters in words, that you can choose upper or lower case letters, the spaces are there for a reason, that different punctuation marks have meanings (fullstop, question mark, talking marks) (Clay, 1993, p.47).

The booklets required for the Concepts About Print observations are *Sand* (Clay, 1972) and *Stones* (Clay, 1979), as they can be used with nonreaders. The child is merely asked to point to the above mentioned features of the book (Clay, 1993).

- **Hearing And Recording Sounds In Words (Dictation Task),** from *An Observation Survey of Early Literacy Achievement*. Marie Clay's dictation task, "Hearing and Recording Sounds in Words," assesses the student's letter-sound knowledge, by dictating one or two simple sentences to the student. For example, when the teacher dictates, *"I have a dog at home."* the student wrote, *"I hf a dok at home."* In scoring the word *dog* in this example, the teacher checks *d* and *o* but does not check the *k* because it is the wrong letter to spell the /*g*/ sound (Clay, 1993).

For more information, see *An Observation Survey of Early Literacy Achievement*, by Marie Clay in the **Instructional Resources** section.

# II. Phonemic Awareness

*" A journey of a thousand miles begins with one step."*

—Confucius

## Definition

Phonological awareness involves the ability to notice sounds in words, think about sounds in words, or manipulate the individual sounds (Torgesen & Mathes, 1998).

## Research

- Phonemic awareness is the most potent predictor of success in learning to read. It is more related to reading than tests of general intelligence, reading readiness, and listening comprehension (Stanovich, 1986, 1994).
- Phonemic awareness is the most important core and casual factor separating typical and exceptional readers (Adams, 1990).
- Pre-school age children's awareness of phonemes of the speech sounds that correspond roughly to the individual letters has been shown to hold singular predictive power, statistically accounting for as much as 50% of the variance in their reading proficiency at the end of first grade (Blachman, 1991; Juel, 1991; Stanovich, 1986; Wagner, Torgesen & Rashotte, 1994).
- A child's level of phonemic awareness on entering school is widely held to be the strongest single determinant of the success the child will experience in learning to read, or the likelihood that he or she will fail (Adams, 1990, Stanovich, 1986).
- Phonological awareness affects children's success in reading due to the orthographic nature of the English language, which encodes speech into phonemes (Yopp, 1992).
- In order to learn to read and spell words, children must understand that spoken words are composed of phonemes that can be manipulated and that these phonemes correspond to letters in written alphabetic script (Ball & Blachman, 1991; Yopp, 1992).
- As important as phonological awareness is to the process of learning to read, it can be a difficult ability for some children to master (Adams, 1990).

# Strategies

The following recommendations for instruction in phonemic awareness are derived from Spector (1995):

- At the preschool level, engage children in activities that direct their attention to the sounds in words, such as rhymes and alliteration games.
- Teach students to segment and blend.
- Combine training in segmentation and blending with instruction in letter-sound relationships.
- Teach segmentation and blending as complementary processes.
- Systematically sequence examples when teaching segmentation and blending.

Yopp (1992) offers the following general recommendations for phonemic awareness activities:

- Keep a sense of playfulness and fun; avoid drill and rote memorization.
- Use group settings that encourage interaction among children.
- Encourage children's curiosity about language and their experimentation with it.
- Allow and be prepared for individual differences.
- Make sure the tone of the activity is fun and informal, not evaluative.
- Spend a few minutes daily engaging preschool, kindergarten, and first grade children in oral activities that emphasize the sound of language, which may go a long way in helping them become successful readers and learners.

In *Learning to Read — Reading to Learn—Tips for Teachers*, an informational guide developed by the National Center to Improve the Tools of Educators, the following suggestions appear:

- Phonemic awareness refers to an understanding that words and syllables are composed of a sequence of elementary speech sounds. This understanding is essential to learning to read an alphabetic language. The majority of children with reading disabilities fail to grasp this idea.
- In teaching phonemic awareness, the focus of all activities should be on the sounds of words, not on letters or spellings.
- Use strategies that make phonemes prominent in children's attention and perception. For example, model specific sounds, such as /s/ in the word *sat,* and ask children to produce each sound in isolation and in many different words until they are comfortable with the sound and understand its nature.
- Begin with simple words and simple challenges (e.g., listen for initial /s/ *sat, sit, sip,* and *sad* or for long */e/* in *me, see, bee*.)
- Teach students to blend phonemes into words. Begin by identifying just one phoneme (e.g., /*m*/-*ilk* or /*s*/-*at*) working gradually toward blending all the phonemes in words (e.g., /s/-/a/-/t/).
- Teach students to identify the separate phonemes within words (e.g., What is the first sound of *soup*? What is the last sound of *kiss*?). Beginning phonemes are easier to identify than final phonemes.
- Once students are comfortable listening for individual phonemes, teach them to break up words, segmenting into component sounds (e.g., /*m*/-/*oo*/-/*s*/ = *moose*).
- Create a sequence of segmenting and blending activities to help students develop an understanding of the relationship between sounds in words.
- Provide children with more support when first teaching a task. For example, model a sound or strategy for making the sound, and have the children use the strategy to produce the sound. Model and practice several examples. Prompt the children to use the strategy during guided

practice, and gradually add more examples. As the students master these skills, provide less teacher-directed instruction and more practice and challenge.

- Using music and songs, march to rhymes and other sound play selections.
- Set up a music center that focuses on phonological awareness by placing a tape recorder in the center with a variety of songs and rhymes.
- Have fun adding or deleting words in songs.
- Let students make up songs based on familiar rhymes or that contain themes (e.g., adapt the lyrics of *Old MacDonald*).
- Sing rhythmic and rhyming songs.
- Make teaching phonological awareness a top priority. Opportunities to engage in phonological awareness activities should be plentiful, frequent, brief, and fun.
- Phonemic awareness is essential for learning to read, but is not enough by itself. It must be coupled with instruction and practice in learning the relationship between letters and sounds.

# Assessment

- *A Phonological Awareness Screening* (developed by Lake County School, distributed to Leon County Reading Cadre (1998-1999).

This screening assessment includes the following:

| Level 1 | Level 2 |
|---|---|
| Word Awareness | Deleting Phonemes |
| Rhyming Words | Phoneme Segmentation |
| Beginning Sound Matching | Sound Substitution with Manipulatives |
| Isolating Speech Sounds | Sound Substitution Without Manipulatives |
| Blending Speech Sounds into Words | |

> **Contact:**  Randee Winterbottom
> Leon County Schools
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- *Test of Phonological Awareness,* by J. Torgesen & B. Bryant, 1994.
  A simple test suitable for administration in small groups or individually.  Adequate for kindergarten screening purposes.  Nationally standardized, and good psychometrics. ($124)
  **Contact:**  PRO-ED
  8700 Shoal Creek Blvd.
  Austin, Texas 78757-6897
  512-451-3246

- *The Phonological Awareness Profile,* by C. Robertson & W. Salter, 1995.
  Criterion referenced tests that assess phonological awareness. Provides a broad assessment of phonological awareness in six subtests.  ($48.95)
  **Contact**:  Lingui Systems
  3100 4th Avenue
  East Moline, IL 61244-0747
  1-800-PRO-IDEA

- *Assessment & Instruction in Phonological Awareness,* by J. Torgesen, & P. Mathes, 1999. This manual has four sections. The first explains what phonological awareness is and how it relates to reading instruction. The second section gives information about assessing, while the third section tells how to integrate this phonological awareness into reading instruction. In the last part, available computer software is described which helps develop children's pre-reading skills.

  **Contact**:   Florida Department of Education
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  Room 622 Turlington Building
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  850-487-1879;
  website: http://www.firn.edu/doe/commhome/

- *Yopp-Singer Test of Phoneme Segmentation,* by H. Yopp, 1995. This short, individually administered test is suitable for kindergarten and first grade children. Research is reported that supports its use in early identification of at-risk children. No norms are available. For more information about the Yopp-Singer Test, see *The Reading Teacher*, Vol. 49, September, 1995, pp.20-29. (See **Appendix:** Yopp-Singer Test of Phoneme Segmentation.)

  **Contact:**   *Assessment and Instruction in Phonological Awareness,* Torgesen & Mathes, 1999.
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# III.  Letter Patterns and Sounds (Phonics)

*"The expert at anything was once a beginner."*

—Hayes

## Definition

Phonics refers to a system of teaching reading that builds upon the alphabetic principles, a system of which a central component is teaching of correspondences between letters or groups of letters and their pronunciations (Adams, 1990).

## Research

- Building words is one of the most effective strategies for learning letter/sound correspondences (Moran and Calfee, 1993).
- Children progress faster in both spelling and reading if they are taught to analyze speech sounds in words and taught how to spell them using sound/symbol correspondence (Whittlesed, 1987).

- Invented/temporary spelling has been recognized as a powerful indicator of phonemic awareness and knowledge of sound-letter relationships (Adams, 1990; Henderson, 1990).
- Invented/temporary spelling not only helps children become better spellers but also facilitates their development of decoding ability in reading (Adams, 1990; Chomsky, 1971; Richgels, 1987).
- Children with reading deficiencies in the upper primary grades exhibit poor decoding skills. When students struggle with too many individual words, they don't know how to effectively tackle a new word (Honig, 1997).
- Becoming automatic with a growing number of words depends on knowing how to use the alphabet system to decode words. This finding is one of the most validated in reading research; therefore, equipping each child with the ability to decode simple words should be a major goal of kindergarten and early first grade instruction (Honig, 1997).
- There is support in several studies for using spelling involving analysis of phoneme segments as a method of teaching beginning reading (Clark and Uhry, 1995).
- The evidence strongly suggests that phonics instruction is of genuine and lasting value . . . it suggests that to become proficient readers, students must appreciate the alphabet principle. They must acquire a sense of correspondence between letters and sounds upon which it is based (Adams, 1990).

## Strategies

- Phonics instruction builds on a foundation of phonemic awareness and can be integrated into a total reading program.
- Teach consonants before teaching vowel sounds.
- Teach each consonant sound in the context of a specific picture and corresponding cue word. Students can visualize the picture to remember the sounds. Tip: tactile-kinesthetic learners prefer action words as their cue words (*s* as in *ski*, *r* as in *run*, *p* as in *play*), while auditory and visual learners prefer nouns.
- Teach each vowel the same way as consonants, focusing on its sounds in the context of a picture and cue word.
- For vowel sounds that say their own name, have students act out each cue word as it is said. The cue words with the pictures might be *a* as in *race*, *e* as in *lean*, *i* as in *ride*, *o* as in *blow*, *u* as in *music*. Once you select a cue word for a particular vowel sound, do not change it.
- For other vowel sounds, the cue words, with the pictures, might be the following: *a* as in *pat*, *e* as in *jet*, *i* as in *pitch*, *o* as in *knock*, *u* as in *tug*.
- Make up a little story for each cue word to enhance the mental picture. The sillier the story, the better!
- After teaching sounds in the context of words, work on letter recognition. Show students a letter while saying its sound. Immerse students in one sound at a time, perhaps spending as long as three days on a single sound. Have students notice the letter when they see it. Consistently connect the letter to its cue word. Never demonstrate a letter in isolation. Always refer to its cue word (*s* as in *sit*).
- Make flash cards for the letters. Use cards of one color for consonants, cards of another color for vowels that say their own name, and cards of a third color for vowels that have a different sound from their name.
- Have students trace over the letters with the second and third fingers of their writing hand while saying the sounds aloud. This works best if they can *feel* the letters. Use letters made

with sandpaper or soft wax crayons, or have students trace the letters in show boxes of sand or salt. Have them use large motions to write them in the air; have them write the letters on each other's backs or on their own arm.
- Include all of the senses in learning the sounds: have students *punch out* sounds and words in the air, sing a song with the target words, or *dance* or *act out* sounds as they say the words (Winebrenner, 1996).

For additional strategies including teaching Word Families, Working with Words, Word Wall, Using Music, Rhythm, and Movement, and Using Typewriters and Computers see *Teaching Kids with Learning Difficulties in the Regular Classroom*, by Susan Winebrenner (1996).

## Assessment
- See *An Observation Survey of Early Literacy Achievement,* (Clay, M., 1993), in **Phonemic Awareness** section.

# IV. Recoding

*"Knowing is not enough; we must apply. Willing is not enough; we must do."*

—Goethe

## Definition
Recoding is translating the spelling of written words into the speech sounds they represent *(Learning to Read: Tips for Teachers)*.

## Research
- Converging research supports the proposition that getting started in reading depends critically on mapping the letters and the spellings of words onto the sounds and speech units that they represent. Failure to master word recognition impedes text comprehension (Snow, Burns, and Griffin, 1998).
- The most reliable indicator of a reading problem is an inability to decode single words (Lyon, 1994).
- Children must have detailed knowledge of words, of how they are spelled, and of how they map onto speech . . . students must be able to practice what they have been taught in decodable text, mostly consisting of words that contain sounds/symbols being taught (Adams, 1990).
- Encoding the sound/symbol correspondences in both directed and free writing sessions provides practice for the children and information for the teacher about how much each child knows about these correspondences (Diamond & Mandel, 1995).
- A reader's ability to remember, imitate, recall, manipulate (pull apart and put back together again), recode (switch between sound, visual and semantic codes), and articulate sounds is essential to early reading (Lyon, 1995).
- To maximize word recognition growth, the wording of children's early texts should be care-

fully coordinated with the content and schedule of phonics lessons (Adams, 1990).

- Having many words that are quickly recognized helps to move the reading along so that problem solving is not necessary on each word (Pinnell & Fountas, 1998).
- Emergent readers use the limited set of words they know (core words) to "anchor their reading"—to help them monitor the way they are reading a text (Pinnell & Fountas, 1998).
- Fluency is supported by a large number of easily recognized words (Pinnell & Fountas, 1998).

# Strategies

**Teach the relation of sounds and letters:**

- Students should learn the letters of the alphabet and discriminate each letter from the other, because each stands for one or more of the sounds that occur in spoken words.
- When presenting each letter, model its corresponding sound and have children produce the sound themselves. For children with learning disabilities, the teaching activities must be explicit and unambiguous.
- At first, teach only a few letter-sound correspondences that have high utility in many words (e.g., /m/ in *man, mad, him, and ham)*. Postpone teaching less frequently occurring letters until students have a firm understanding of how left-to right spellings represent first-to-last sounds (alphabetic understanding).

**Teach children how to sound out words:**

- After students have mastered a few letter-sound correspondences, teach them to decode words:
  1. Begin with small, familiar words.
  2. Teach the children to sound out the letters left to right.
  3. Teach the children to blend them together, searching for the word in memory.
- Model sounding out the word, blending the sounds together and saying the word. The ability to sound out new words allows children to identify and learn new words on their own.
- Give children stories containing words that reflect the letter-sound patterns that have been taught, and encourage them to sound out words whenever they are uncertain.
- Help children learn spelling conventions, such as the use of final *e'*s to mark long vowels, comparing and contrasting lots of examples.
- Pinnell and Fountas (1998) suggest showing students how words work by using *chunks* to read and by helping children acquire the following repertoire of strategies to use when solving words:
  1. Letter—sound strategies
  2. Visual strategies
  3. Structure and meaning to spell or pronounce
  4. Known and unknown words
  5. Proof reading skills, study methods, and using references to learn more about words.

**Teach children to recognize most frequently used words *by sight*:**

The following sight word strategies are taken from *Preventing Reading Difficulties In Young Children* (The National Research Council, 1998).

- Use predictable books to establish repeated words as sight words.
- Rebus books are designed to build a basic sight repertoire of short and very frequently used words.
- Use word directed activities that focus on the frequently used words.

**Teach children how to spell words:**

The following teaching strategies are taken from *Learning to Read—Reading to Learn: Tips for Teachers* (National Center to Improve the Tools of Educators, 1998).

- Teach children to spell words by sounding their letters one by one. Model the sounding and spelling process for children as they spell.
- Begin with short words that children can sound out, because these words follow regular spelling convention (e.g. *bat, cap,* and *sit* instead of *cape, bait,* or *sight*).
- Begin with simple words that do not contain consonant blends (e.g. *ham* and *pan,* instead of *slam* and *plan*).
- Encourage students to use spelling knowledge and strategies in their own writing.
- Introduce spelling conventions systematically. Begin with words that exemplify the most frequent and basic conventions, and provide support and practice to help students generalize from these words to others. The goal is to help them see the spelling conventions in the words. (See **Appendix:** *Phonic Generalizations for 1st Grade*).
- Use words in which letter-sound correspondences represent their most common sounds (e.g., *get* instead of *gem*).
- Develop a sequence and schedule of opportunities that allow children to apply and develop facility with sounds and words at their own pace. Specify what skills to assess and when to assess them so that you will know when to move on. Take into account each student's background knowledge and pace in moving from sounding out to blending words to reading connected text.
- Pinnell and Fountas (1998) suggest using a system for Comprehensive Word Study that includes individual word lists chosen by both teacher and student. Spelling lists are composed of both *core* words (teacher-chosen words, which teach useful strategies, principles or patterns) and three or four *personal* words (from children's personal writing).
- Pairing students as buddies facilitates both study and test taking.

## Assessment

- Recent research (Clay, 1993) has made it clear that we must pay attention to four aspects of how the sounds of English are represented in print.
  1. Children must learn to hear the sounds buried within words which is not an easy task.
  2. Children must learn to visually discriminate the symbols we use in print.
  3. Children must learn to link single symbols and clusters of symbols with the sounds they represent.
  4. Children must learn that there are many alternatives and exceptions in our system of putting sounds into print.
- The developmental stages of spelling as cited in *Word Matters*, (Pinnell & Fountas) are as follows:
  1. *Beginning speller*—becomes aware of the sound in words and some letters.
  2. *Emergent speller*—understands that words are made up of sounds, connects sounds with letters, and recognizes a few high frequency words.
  3. *Early speller*—knows many sound-letter patterns, writes and reads using letter-sound relationships.
  4. *Transitional speller*—knows consonant and vowel patterns and relationships and is moving from reliance on regular letter sounds.

5. *Self-extending speller*—has a broad base of information and uses letter-sound patterns and a range of information flexibly in reading and writing.
6. *Advanced speller*—understands the variety of rules and principals of how words work. Uses historical roots to derive meaning of words and has knowledge of base words and inflections, root words, and meanings.

For more information, see the following in the **Instructional Resources** section:
*The Four Blocks*
*How to Teach Spelling (*Rudginsky, L.T. & E. C. Haskell)
*Peabody Peer-Assisted Learning Strategies in Reading (PALS)*
*Reading Mastery (SRA)*
*Reading Recovery*
*Spell It Myself,* (Benge, J.)
*Teaching Kids to Spell,* (Gentry, R. J.)
*Word Identification Strategy (*Lenz, K. B., Schumaker, J. B., Deshler, D. D.,  & Beals, V. L.)
*Word Matters: Teaching Phonics and Spelling in the Reading/Writing Classroom* (Pinnell & Fountas)

# V.  Fluency

*"Even if you're on the right track,*
*you'll get run over if you just sit there."*

—Will Rogers

## Definition

Fluency is the automaticity and flow in the act of reading (Stein, 1993).  Automaticity is the quality of fluency; it implies automatic level of response with various tasks, such as speed of retrieving the sound for a specific letter (Wagner & Torgesen, 1987).

## Research

- The most effective way for students to become fluent with a specific word is for them to consciously process both the letter patterns and sound of the word the first few times it is read (Share, 1995; Siegal, Share & Geva, 1995).
- Developing reading fluency is necessary in order for a person to read at a speed where understanding and enjoyment is maintained (http://www.sil.org/lingualinks/library/literacy/).
- To become a fluent reader, a learner must hear fluent reading and develop good word attack skills (http://www.sil.org/lingualinks/library/literacy/).
- The most important point is that a child absolutely must be reading beginning books by mid-first grade. Those who miss out in the early first grade need *organized intervention* immediately, because otherwise they *almost never recover* (Honig, 1997; Schlafly, 1996).
- Repeated reading of sentences and passages are found to produce marked improvement in children's word recognition, fluency, and comprehension (Samuels, 1985).
- It appears that across cultures and languages, pushing students to read orally about 20% percent faster decreases their errors and increases their comprehension (Berlinger and Casanova, 1993).

- When readers cannot recognize a word or a spelling pattern and have no one to ask, they have one of two options: they can use context clues or pictures to guess or finesse its identity, or they can sound it out. Each of these options produces its own patterns of error and disfluency (Stahl, 1997).
- Fluency comes from lots of easy reading. Non-fluent readers are often older children who do not think of themselves as good readers and do not want to read the easy book they deem *baby books*. There is an almost certain prescription for developing fluency: lots of very easy reading (Cunningham, 1995).
- If too many words in a text are problematic, comprehension and reading growth are impeded (1985, Clay).
- Error rates for young poor readers should not exceed 1 word in 20 (Clay, 1985; Wixson & Lipson, 1991).
- Better readers spend a higher proportion of the year reading books. *High progress* readers read 20,000 words per year. *High/middle*—15,000 words per year. *Low/middle*—10,000 words per year. *Low*—5,000 words per year (Wade, T., 1978).
- For readers who are progressing normally, it is often not before the middle of second grade that the ability to read with expressive fluency and comprehension emerges reliably (Chall, 1983; Gates, 1947; Gray, 1937; Ilg and Ames, 1950).
- Clinical (Harris & Sipay, 1975) evidence and laboratory (Stanovich, 1984) evidence concur that children who can read second-grade texts accurately can read and learn from text with reasonable efficiency and productivity on their own, provided the text level is appropriate. One of the most important questions for second and third grade teachers is, therefore, how to best help children reach this level. Given that the goal is to help children learn to read the words and understand them, too, a promising tactic would seem to be to engage them in more connected reading of appropriate text.

## Strategies

- The following fluency skills need to be developed: 1) immediately recognizing letters and frequent clusters of letters, 2) learning frequent words by sight, 3) seeing phrases as wholes, and 4) using prediction skills within the phrase or clause (http://www.sil.org/lingualinks/library/literacy/glossary/cjJ416/krz939.htm). *Great Leaps Reading and PALS (Peer Assisted Learning Strategies,* listed in **Instructional Resources,** are resources that have specific activities for increasing fluency skills.
- In order to increase fluency, provide lots of opportunities of *easy* reading.
- Determine the child's reading level. Children who read text accurately and fluently can read and learn from text, provided the level is appropriate. (See Assessment section.)

Stein (1993) suggests the following:
- The teacher should introduce each new basal selection by reading it aloud.
- The discussion should follow the reading of the selection, which is complemented with teacher and student generated questions and vocabulary work.
- The selection should be explored more analytically with the help of organized frames such as story maps, plot charts, and Venn diagrams.
- Children in need of extra help should be pulled aside for echo reading. (Each paragraph is read first by the teacher and then by the student.)
- Students should read the selection again at home, preferably aloud to a parent.

Fielding and Roller suggest some practical ideas for making easy books acceptable:
- Model, by reading aloud, the enjoyment of easy books.
- Alter purposes for easy reading by having older children read these books to younger buddies.
- Allow children to make tape recordings of favorite books.
- Make the expanding world of non-fiction books readily available.
- **Assisted Reading:** The "Curious George" Strategy for Students with Reading Problems (Richek and McTague, 1998)

  Teacher assists a group of children through repeated readings of some text. Usually, the teacher reads the text the first time. The children chime in with known words the second time, and rereading continues as the children take over more and more of the reading. This procedure helps second and third grade remedial readers develop reading fluency, confidence, and enjoyment. Use series of books (e.g. Curious George books).
- **Choral Reading** is a time-tested strategy, which will help children become fluent readers. Decide which parts everyone (the chorus) should read and which parts will make good solos. Assign parts and solos.

  Practice the piece several times with the readers becoming fluent each time.

  Perform the choral reading for a group or make a video or audiotape of the performance.

  Use duplicate copies of a familiar poem or chant on chart paper or overhead.
- **Big Buddy: Easy Reading for Fluency** from Phonics They Use (Cunningham,1995) is a strategy for students who are still not reading fluently. Using easy books, e.g., Dr. Seuss, Clifford books, etc. have these students read to younger children.
  *Weeks 1 & 2*
  >Read books to children and let each child choose one book to prepare to read to the kindergarten buddy.
  >Children practice reading the book several times: with a partner, to the tape recorder, and finally to the teacher.
  *Week 3*
  >Children read their books to their kindergarten buddies and discuss the books with their buddies. The teacher makes a chart on which each child lists the book he/she reads aloud that week. Review the chart to identify who has read what books. Remind students of some other books that may not have been chosen and lead students to choose a second book.
  *Week 4*
  >Continue the partner reading, tape recorder reading, and reading to the teacher. However, if a child chooses a book which another child read the previous week, that child becomes the "expert" on that book and reads the book to or listens to the new reader at least once. Children read to their kindergarten buddies and discuss the book with them. Children list the second book they read on the chart.
  *Week 5*
  >Children continue without their teacher's assistance.

# Assessment

- *Great Leaps Reading* is a resource that has assessments built into the program. (See **Instructional Resource** section.)
- *Test of Word Reading Efficiency (TOWRE)* is a nationally normed measure of word reading accuracy and fluency. It can be administered very quickly and provides an efficient means of monitoring the growth of both *sight words* and the ability *to sound out* words quickly. *TOWRE* complete kit can be purchased for $144.00 from: pro-ed, 8700 Shoal Creek Boulevard, Austin, Texas 78757-6897. http://www.proedinc.com
- Determine a child's reading level by assessing his/her accuracy while reading text. By using *Running Records*, as developed by Marie Clay, a teacher listens to a student read aloud, while he/she keeps a record of errors, i.e., substitutions, insertions and omissions (Clay,1993).
- **Reading levels** are defined as the following, in *How to Increase Reading Abilities,* by A. J. Harris & E. R. Sipay (1975):

1. **Independent Reading Level**—95–100% of words read correctly. Child reads easily and fluently and without assistance.
2. **Instructional Level**—90–94% of words read correctly. Highest level that child reads easily with teacher supervision. Errors are not frequent; comprehension is satisfactory.
3. **Frustrational level**—80–89% of words read correctly. Child's reading skills break down. Fluency disappears, errors are numerous, and comprehension is faulty.

- Fluency can be informally assessed through observation *(Guided Reading—Good First Reading for All Children*, Fountas & Pinnell, 1996).
- Formal assessment can be done by having a student read aloud a selection that he or she has read twice before and can read with above 90% accuracy (Clay, 1994).
- Use a rubric to assess a student's reading by tape recording. Later, calculate the number of words read per minute (reading rate) and rank tapes against this rubric, **Rubric for Fluency** (Fountas & Pinnell, 1996):

   1. **Beginning fluency**—All word-by-word reading with long pauses, little awareness of punctuation.
   2. **Mostly word-by-word reading**—Two-word phrasing, evidence of punctuation, rereading for problem solving may be used.
   3. **Mixture of word-by-word reading**—Fluency and phrased reading, attention to punctuation, rereads for problem solving.
   4. **Fluent, phrased reading**—Reading primarily in large meaningful phrases. Fluent, phrase reading, attention to punctuation and syntax, rereading for problem solving is present.

For more information, see *Great Leaps* in the **Instructional Resources** section.

# VI. Vocabulary Development

*"I am a Bear of Very Little Brain, and long words bother me."*

—A. A. Milne, *Winnie-the-Pooh*

## Definition

Vocabulary development is the growth of a person's stock of known words and meanings. (Harris and Hodges, 1995).

## Research

- Teachers play a critical role in helping diverse learners develop into life-long word learners by consistently reviewing the importance of vocabulary development, by verbally reinforcing their students for independent word-learning efforts, and by assigning classroom activities that require a range of independent word-learning strategies (Baker, Simmons, and Kameenui, 1998).
- Students need strong beginning reading skills to engage successfully in the volume of reading necessary to gain exposure to and possibly learn large numbers of word meanings from independent reading of connected text. Reading allows students to "reflect" on the meaning of words in a way that speech cannot (Baker, Simmons, and Kameenui, 1998).
- Learning vocabulary entails elaboration and discussion of word meaning and multiple opportunities to practice using the words (Beck and McKeown, 1991; Stahl and Fairbanks, 1986).
- Building knowledge requires more than accumulating facts about specific elements such as word definitions (Baker, Simmons, and Kameenui, 1998).
- Students are often overloaded with inappropriate vocabulary (Gentry, 1990).
- It is better to learn a few words well than many words superficially (Nagy, 1989).
- Christen and Murphy (cited in Smith, C. B.) contend that research clearly emphasizes that for learning to occur, new information must be integrated with what the learner already knows.
- Kueker (cited in Smith, C. B.) claims that teaching vocabulary as a prereading step is critical when readers lack prior comprehension.

## Strategies

- If teachers could add another 25 minutes per day to children's reading time, an additional thousand words could be learned in a year (Nagy, 1989).
- Read to students to provide exposure to new words and increase vocabulary.
- Teachers should stop and explain meanings of new words or ask students to predict meaning.
- Add words to word wall.
- Writing develops general vocabulary. Write daily, using logs, reactions to stories, topic and report writing.
- Use mnemonic devices and visual cues to connect words with their meanings. (See *Vocabulary Cartoons,* in **Instructional Resources** section).
- Keep a **vocabulary notebook**  (See McREL Blackline Masters, in **Instructional Resources** section).  The following activity is led by teacher or done in collaborative learning groups.
  A. Initial Encounter with Word (or Phrase)
      1. Write word and date first encountered.
      2. Describe context of initial encounter.

    3. Explore, discuss, and begin to formulate a definition related to that context.
    4. List examples generated from personal experiences and prior knowledge.
    5. List nonexamples generated from personal experiences and prior knowledge to show what the word is not or how it differs from other closely related words.
    6. Write a definition in your own words; compare with dictionary or glossary.
    7. Develop appropriate graphic organizers, such as word maps, attribute charts, and compare/contrast diagrams.
    8. Create visual association drawings, if appropriate.
  B. Additional Encounters with Word (or Phrase)
    1. Write additional date(s) encountered.
    2. Describe context of new encounter and compare with previous contexts.
    3. Explore, discuss, and begin to formulate a definition in new context(s) and relate to previous definition(s).
    4. Add to, revise, and elaborate on work done in steps 4,5,6,7, and 8 listed under Initial Encounter with Word (or Phrase).

- Use instructional routines and vocabulary templates which incorporate modeling, mapping, analyzing (See **Appendix** for a sample of McREL's Blackline Masters, *from Teaching Reading In the Content Areas: If Not Me, Then Who?)*

- Use ***Concept Definition Mapping*** (Schwartz, 1988), a strategy for teaching students the meaning of key concepts. Concept definition maps are graphic organizers that help students understand the essential attributes, qualities, or characteristics of a word's meaning. Students must describe what the concept is, as well as what it is not, and cite examples of it. Looking up the concept's definition in the dictionary is not nearly as effective as this process, which gives students a more thorough understanding of what the concept means, includes, and implies. The mapping process also aids recall.
  1. Try a flip chart or overhead transparency to display an example of a concept definition map.
  2. Ask questions: What is it? What broader category or classification of things does it fit into? What is it like? What are essential characteristics?
  3. Use modeling of familiar vocabulary terms from previous lessons or units.
  4. Allow students to work in pairs. They can use a dictionary or glossary, but encourage them to use own experiences and background knowledge.

(For more information, see **Instructional Resources**: *Teaching in the Content Areas: If Not Me, Then Who?*)

- Use the ***Frayer Model*** (Frayer, Frederick, & Klausmeier, 1969), a word categorization activity. Students can refine their understanding by choosing examples and non-examples of the concept. The *Four Square* version of the model works well with younger children.
  1. Assign the concept or word being studied.
  2. Explain all attributes of the model and use an easy word, such as *polygon,* to model with the class.
  3. Have students work in pairs.

(For more information, see **Instructional Resources:** *Teaching in the Content Areas: If Not Me, Then Who?*)

- Relate words to students' prior knowledge (e.g., discussion, scaffolding, semantic mapping).
- Teach words in related sets when possible: Semantic Maps (brainstorm, categorize, label,

discuss words related to target word); Semantic Feature Analysis (identify whether a class of objects has or does not have identified semantic features).
- Use generative responses. (Use the words in writing or drawing to illustrate the meaning to increase recall).
- Provide for frequent encounters with the word (multiple exposure).
- Provide for breadth of knowledge about each word taught (e.g., firsthand experience, games, puzzles, and demonstrations).

# VII. Comprehension

*"What we become depends on what we read after all the professors have finished with us.  The greatest university of all is a collection of books."*
—Thomas Carlyle

## Definition
Reading comprehension is the ability of the reader to interact with words and concepts on the page in order to understand what the writer has said, and to apply or make use in some way of the information supplied by the author.

## Research
- From the very beginning children should be given all of the elements necessary for constructing meaning.  This is important because reading at this early level is a new enterprise, and children must be made aware that reading is always directed toward meaning (Anderson, Hiebert, Scott, Wilkinson, 1985).
- Reading comprehension is a skill that needs development over time; it is difficult to practice comprehension if decoding is underdeveloped (Clark and Uhry, 1995).
- The following are the main reasons students do not comprehend, according to NICHD and Honig (1997): weak word recognition, limited vocabulary and syntactic knowledge, no internalized strategies, insufficient reading experience, and poor motivation.
- The most effective classroom method for early reading instruction involves a combination of explicit instruction in word recognition skills and reading comprehension strategies with opportunities to apply and practice these skills in literature (Lyon, 1994).
- If readers invest too much time and mental effort decoding individual words, they cannot attend to the passage meaning.  The rule of thumb is this: a student should recognize 18 or 19 out of 20 words automatically.  Otherwise, reading comprehension suffers (referred to as automaticity).  Additionally, by sixth grade, if students are reading below 100 to 120 words a minute, they cannot attend to meaning properly (Honig, 1997).
- First grade decoding ability predicts 80 to 90 percent of reading comprehension in second and third grade and still accounts for nearly 40 percent of reading comprehension in ninth grade (Honig, 1997).
- According to Pearson and Dole (1988), explicit instruction for teaching reading comprehension involves four phases:
  **Phase 1**—teacher modeling and explanation

**Phase 2**—guided practice during which the teacher "guides" students to assume greater responsibility for task completion

**Phase 3**—independent practice accompanied by feedback

**Phase 4**—application of the strategies in real reading situations

- The single most valuable activity for developing children's reading comprehension is reading itself.  The amount of reading that children do is shown to predict the following:
  1. the growth in reading comprehension across the elementary school year even after controlling for entry-level differences;
  2. the quantity as well as the language, vocabulary, and structure of students' writing;
  3. the richness of their oral storytelling;
  4. receptive vocabulary, verbal fluency, and content-area achievement among older students and adults (Anderson, 1984; Adams, Treiman, and Pressley, 1996; Stanovich, 1993).
- Research has shown that ideal readers actively pursue meaning, carrying on a mental dialogue with the writer.  According to Billmeyer (1996), an ideal reader's mind, or mental disposition, is alive with questions:
  1. What is this text about?
  2. How does that fit with what I already know?
  3. What is the author trying to say?
  4. What is going to happen next?
  5. What does the author mean?

# Strategies

- **Read-a-lot**
  Each year of elementary, middle, and high school, students should set a goal  of 25 to 35 grade-appropriate fiction and non-fiction books to be read (Honig, 1997).
- **Read Aloud**
  The single most important activity for building the knowledge required for eventual success in reading is reading aloud to children (Anderson, et al, 1985).
- **Rereading**
  Rereading results in marked improvement, not just in children's needs, accuracy, and expression, but also in their comprehension and linguistic growth.  Rereading gives a chance to revisit and reflect on the meaning, message, and language of a text (Reading Task Force).
- **Discussion of Books**
  In the earlier grades, this strategy can be enhanced by the teacher, reading aloud to the class material that is too difficult for them to read and then using it as a basis for the discussion (Honig, 1997).
- **Strategic Reading**
  Strategic reading develops metacognition skills by connecting what students already know, asking internal questions about the material, explaining what has been read to someone, or writing about something.
- **Summarization**
  Summarization includes such activities as substituting categories for lists of items, integrating a series of events with a descriptive action term, and selecting or inventing a topic sentence, so that students can explain what happened or give the structure of an argument in their own words.

- **High-Quality Children's Literature**
  Growth in comprehension depends on reading a substantial number of words each year from a variety of high-quality children's literature and informational texts such as favorite stories, children's newspapers, science and history books, biographies, and so on (Honig, 1996).
- "Because comprehension is a complex and invisible process, it is easy to confuse methods designed to get evidence of comprehension with comprehension itself." (Fountas and Pinnell, 1996).

## Assessments

- Informal assessments are important in determining students' reading comprehension (Fountas and Pinnell, 1996).
  1. Asking children if they understand a story or an informational piece.
  2. Having conversations with the children about the material read.
  3. Observing children as they respond to the text both verbally and nonverbally.
  4. Observing children's behavior for evidence of using cues while reading.
  5. Observing children's responses to the text in art and writing.

# VIII. Study Skills and Content Enhancements

*"Failure to prepare is preparing to fail."*

—Unknown

## Definition

Study skills and strategy instruction are a must for any literacy program that presumes to be child centered. . . . Study strategies might be best thought of as the *practical* side of literacy…A typical study strategy curriculum, for example, includes (but is not limited to) topics like time management, note taking, study reading, memory techniques, report writing, and even reading rate (Manzo and Manzo, 1995).

## Research

- All children need some organized skills instruction to reach optimal reading levels. Due to the absence of early, organized skill instruction, a growing number of students are not reaching their optimal level of reading proficiency. Fifty percent are not fluent in grade appropriate materials, and thirty to forty percent remain non-readers (Honig, 1996).
- Students, who came from classrooms where teachers provided suggestions for cognitive strategies for learning and remembering were better able to verbalize about the nature of the training procedures and performance in the task than were the students from classes where teachers rarely suggested learning and memory strategies (Berlinger & Casanova, 1993).
- Advanced strategic reading skills such as summarizing, predicting, questioning, and visualizing should be modeled and directly taught in the context of reading varied materials (Diamond & Mandel, 1995).

- Many study skills are given only passing mention and attention in our schools. However, everyone needs systematic, planned instruction and practice to meet the challenges of content material and to be able to read in order to learn throughout life (Blair & Rupley, 1988).
- Knowing that certain techniques and strategies can be used to assist learning, knowing which techniques are useful in which kinds of learning situations, and knowing how to use the techniques are powerful tools that can enable students to become strategic, effective, lifelong learners (Sturomski, 1997).
- When skills are internalized, we do not have to pay attention to them, and thus we can devote more attention to processing new information. In short, it is practice— a lot of it— that enables the learner to internalize a skill or process (Marzano & Pickering, 1992).
- Use task analysis and step-by-step teaching to break comprehension down for children with reading difficulty (Clark & Uhry, 1995).
- It is necessary to illustrate the different situations in which the skill or process can be used and to develop the contextual knowledge important to a skill or procedure (Paris, Lipson & Wixson, 1983).
- Cognitive instruction in the content areas includes skills and strategies. Skills are mental activities one applies to specific learning tasks, while strategies are specific procedures or ways of executing given skills (Jones, Palincsar, Ogle, & Carr, 1987).
- Students who lack the necessary study skills will have difficulty with classroom reading demands (Billmeyer, 1996).

## Study Skills

- Methods of teaching study skills for reading content area assignments through content enhancement strategies are required for students to be successful in the challenging curriculum today. *Content Enhancement Routines* are designed to help teachers organize and present information in a manner that benefits a wide range of students.
- "Teachers often modify standard teaching procedures to make them more interesting. The more frequently students see and experience sound, explicit instruction, the more confident they become in what they know and what is expected of them. In general, students tell teachers that they prefer the use of the devices and the routines. Teachers should use these routines as a springboard for instruction that both maximizes learning and is interesting for students" (Deshler, D., 1997). See *Content Enhancement Routines*, in the **Instructional Resources** section.

## Study Skills Strategies

The following study skills are designed to enhance the content areas in a way that students' study habits improve and increase students' acquisition of the content. Research shows that the following reading strategies and study skills should receive increased attention in schools:
- **Skimming** textual material for basic ideas
- **Scanning** textual materials for specific information
- **Listening** for important information
- **Note taking**
- **Memorizing** facts, including rehearsal and associative strategies
- **Organizing** information, including categorization and flow charting
- **Questioning** to increase comprehension

- **Problem solving** to derive conclusions
- **Taking tests** more systematically
- **Error monitoring** to correct one's own mistakes

# Reading in the Content Area

Content area teachers need to teach reading skills in their own area of specialization to help increase students' reading comprehension. The following, listed by content area, is a suggested list of skills to teach. Lists were adapted from *Comprehensive High School Methods* (second edition), by D. Shepherd and from *Reading Strategies for Middle and Secondary School Teachers* (second edition), by L. Burmeister.

- **Social Studies**
  1. Interpreting maps and pictures
  2. Understanding cause and effect patterns of writing
  3. Understanding sequence of events and overlapping of time periods
  4. Noting similarities and differences
  5. Dealing with detailed statement of fact
  6. Recognizing propaganda techniques
  7. Differentiating fact from opinion
  8. Dealing with time, place, space concepts
  9. Following directions
  10. Classifying
  11. Applying information to new situations
  12. Making inferences
  13. Adjusting rate to purpose and difficulty of material
  14. Noting main idea and supporting details
- **Science & Health**
  1. Reading the concise style that is the nature of scientific writing as opposed to narrative writing
  2. Seeing relationships
  3. Interpreting charts, tables, graphs, formulas
  4. Varying the rate of reading according to the purpose
  5. Understanding the parts of the book and its particular learning aids such as margin notes, boldface print, review statements, etc.
  6. Getting information from government publications and bulletins
  7. Reading for exact meaning
  8. Reading directions accurately
  9. Evaluating, drawing conclusions, making judgements
  10. Applying information from reading to practical problems
  11. Fusing reading skills with steps in the scientific process
  12. Classifying
  13. Establishing cause-effect relationships
  14. Seeing similarities and differences
  15. Recognizing sequences
- **Industrial Arts**
  1. Following directions accurately
  2. Reading diagrams, charts, patterns, cutaways, plans, and drawings

3. Gaining information from technical magazines, catalogs, journals
4. Reading for main ideas and details
5. Noting relationships
6. Understanding occupational information of a trade nature about careers or leisure activities
7. Applying information as in job sheets, planning for production, safety signs

- **Home Economics**
  1. Following directions
  2. Reading diagrams, recipes
  3. Dealing with time, space, quantity concepts
  4. Reading for a purpose
  5. Applying information to new situations
  6. Noting main ideas and supporting details
  7. Getting information from government publications and bulletins
  8. Establishing cause-effect relationships
  9. Seeing similarities and differences
  10. Recognizing sequences
  11. Adjusting rate to purpose and difficulty of material
  12. Visualizing what is read

- **Art**
  1. Following directions accurately
  2. Reading for a purpose
  3. Noting details
  4. Getting information from pictures
  5. Using social studies reading skills when reading biographies or art history.

- **Music**
  1. Reading musical notation—symbols
  2. Reading for background and enrichment such as biographies (see social studies list)
  3. Reading technical vocabulary derived from foreign languages—more advanced
  4. Reading music theory using skills similar to those used in mathematics (see mathematics list below)
  5. Reading critiques: considering qualifications and view of author, making evaluations and judgments

- **Physical Education**
  1. Following directions
  2. Reading diagrams, charts, tables
  3. Reading for a purpose
  4. Adjusting rate to purpose and difficulty of material
  5. Getting information from pictures
  6. Noting main ideas and details
  7. Differentiating fact from opinion
  8. Dealing with time, place, space concepts
  9. Making inferences
  10. Applying information to new situations

- **Mathematics**
  1. Reading methodically to get specific information

2. Analyzing information from tables, formulas, equations
3. Solving work problems
4. Interpreting pictures, diagrams, graphs
5. Relating previous information to what is currently being read
6. Following directions
7. Understanding specialized vocabulary, which includes
   a. technical words (sine, arc, linear)
   b. general words with specific math meanings (prime, natural, square)
   c. process words (time, subtract, column)
   d. general words which must be understood for good comprehension

# Content Enhancement Instructional Strategies

- Simple enhancers are devices that teachers can use to make their content come alive for students.  Examples of simple enhancers include

| | |
|---|---|
| stories | 3D Objects |
| pictures | cartoon |
| music | analogies |
| charts | maps |
| role playing | games |
| songs | rhymes |
| movies | raps |
| overhead transparency notes | mnemonic devices |
| models | |

- First, the teacher needs to identify the most important content in a lesson that is not going to be enhanced with the more complex routines.  Second, as the teacher searches for simple enhancement devices for these pieces of critical information, the teacher should keep in mind that the perfect device needs to make an abstract concept or idea concrete, tie the new information into already known information in some way, or make the new information memorable in some way.

  For example, the abstract concept "sectionalism" might be made concrete by peeling an orange in front of the students and explaining how forces (one's hands) can tear the orange into sections, just like forces tore the country into sections at the time of the Civil War Statenotes, 1996).

- Below are *Content Enhancement Routines*, by Deshler, et al., which can assist students in studying in all subjects (see **Instructional Resources**).
  1. The **Quality Assignment Routine** helps teachers present and ensures learner comprehension and awareness of high quality assignments during group instruction. General education teachers can use this routine to
     —plan assignments that all students can complete at a high level of quality
     —present assignments to students
     —evaluate assignment products and give feedback to students.
     Using this routine, teachers also teach their students how to record assignments and use a strategy called *REACT* to ensure that they have all the information they need and that they can set goals and make a plan for completing the assignment.
  2. The **Concept Anchoring Routine** focuses on how teachers help students connect new concepts to previously learned concepts to increase student understanding and retention of

new information. The routine shows how to use a graphic, *the Anchoring Table*, to present a new, difficult concept using a familiar concept selected by the teacher. Teachers present and summarize similar characteristics possessed by the two concepts. Then the teacher and students can explore

—salient characteristics of the familiar concept

—similar characteristics possessed by the new concept and how the shared characteristics enhance learning.

This routine actively engages the students in creating a summary statement that shows understanding about why the analogy is meaningful.

3. The **Concept Mastery Routine** focuses on how teachers can help students understand and master key concepts within curriculum content. The routine shows how to use a graphic, *the Concept Diagram,* to

—identify a target concept

—place that concept within a larger framework

—explore students' background knowledge of the concept

—specify salient characteristics

—analyze both examples and nonexamples

—construct a definition of the concept.

This routine actively engages the student in testing a new previously unencountered item to determine whether it belongs to the target concept group.

4. The **Concept Comparison Routine** focuses on how teachers help students compare and contrast two or more concepts. This routine shows how to use a graphic, *the Comparison Table*, to specify two or more concepts and to explore characteristics of each. Then, salient characteristics that are not common between or among the concepts also are explored. The routine also encourages higher order thinking because students are guided in identifying larger categories into which the similarities and differences can be grouped. This routine actively engages the student in creating a summary statement that demonstrates understanding about the similarities and differences between or among concepts.

5. The **Recall Enhancement Routine** focuses on how teachers can help students create remembering systems during group instruction to help students organize and recall a set of information they have been taught. General education teachers can use this routine to

—organize a set of information they have taught students

—involve students in creating a recall device to help recall

—help link the recall device to background knowledge

—explore how the recall device can be used to help recall

—test recall to ensure that students are using the recall device effectively.

6. The **Clarifying Routine** focuses on how teachers help students to identify, explore, and organize information that supports the comprehension of factual information. A graphic organizer is used to help teachers

—identify a critical supporting detail

—explore key information about the detail

—relate what the student already knows to the detail

—clarify accurate and confusing uses and interpretations that might be associated with the detail

—summarize what students should remember about the detail and how it supports the understanding of bigger ideas and concepts in a lesson.

7. The **Unit Organizer Routine** focuses on how teachers can frame and then teach a unit of information with students. A unit is any *chunk* of content that a teacher selects to organize into lessons and that ends with a test or closure activity. Typically, a subject-area course is divided into several such units. By framing a unit, the teacher helps students see and understand the big picture of the unit. Specifically, the Unit Organizer Routine helps teachers introduce and build a unit so that everyone can
    —understand how the unit can be part of bigger course ideas or a sequence of units
    —see a method for organizing knowledge
    —define the relationships associated with knowledge
    —clarify what has been done in relation to what must be done
    —monitor progress and accomplishments in learning
    —recognize what has been learned through self-questioning
    The Unit Organizer Routine can be used to help students become oriented to where they have been, where they are, and where they are going in learning.
8. The **Survey Routine** helps teachers lead students through a prereading survey of different reading assignments (such as chapter books or stories). It provides an overview of a reading assignment. The purpose of the routine is to make students aware of the main ideas associated with the reading passage and to help students focus on the most important information in the passage as they read it later. Through the use of this routine, the students and teacher
    —discuss the title of the reading passage
    —make a prediction about the contents of the passage
    —identify relationships among the current reading passage and other passages within the unit of study
    —read and paraphrase the introduction of the passage
    —determine the structure of the passage
    —name the main parts
    —identify key information within the passage
    —read and paraphrase the summary of the passage

For more information, see the following in the **Instructional Resources** section:
*Assignment Completion Strategy* (The Edge Enterprises, Inc.)
*The Test Taking Strategy* (The Edge Enterprises, Inc.)
*Starting Early With Study Skills -A Week-By-Week Guide for Elementary Students* (Irvin, Rose, Longwood Division, Allyn & Bacon )
*ACT Study Power* (American College Testing Program )
*The Differentiated Classroom: Responding to the Needs of All Learners* (Tomlinson, Association for Supervision and Curriculum Development)
*Learning Power* (Great Source)
*PASS Volumes* (Educational Products Distribution)
*Reading Test Success* (Great Source)
*Skills for School Success* (Curriculum Associates, Inc.)
*Study Skills* (Steck-Vaughn)
*Teaching Study Strategies to Students with Learning Disabilities* (Longwood Division, Allyn & Bacon)
*Advanced Skills for School Success* (Curriculum Associates, Inc.)
*SLANT: A Strategy for Class Participation* (FDLRS)

# IX.  Writing

*"Written communication is the glue that holds together the whole ball of wax of modern civilization and culture."*

—Peter Drucker, Business Consultant

## Definition

Writing acquisition is the developmental progression in learning to write for purposes of communication.  From the young child's use of scribbles and drawings in an effort to communicate, to the sophistication of the mature writer, who has gained control of writing processes and has developed a sense of audience (Harris and Hodges, 1995).

## Research

- The Writing Process is the many aspects of the complex act of producing a written communication; specifically, planning or prewriting, drafting, revising, editing, and publishing (Harris & Hodges, 1995).
- Most normal children enter school knowing more than 2,000 words that they are able to combine in syntax "nearly as complex as that used by adults" (Martin & Friedberg, 1986).  It is assumed that these children can readily apply this knowledge to writing the letter sounds of the English language in words, sentences, and stories, which will lead them to grasp the alphabetic principle in a very short time (Clark & Uhry, 1995).
- According to the most recent National Assessment of Educational Progress Data, the average student spends about 30 minutes a week writing (Jones, 1995).
- Young children learn to read words that they themselves have composed more easily than words written by someone else (Montessori, 1964; Chomsky, 1979).
- Creating conditions conducive to lots of reading promotes everything from vocabulary development to comprehension and writing skills and helps test scores (Krashen, 1993).
- The complex skills of writing are still taught in a primitive fashion.  Despite research showing the importance of regular practice in writing, it still gets short shrift in the classroom (Schmoker, 1996).
- An alarming number of students are required to write without the benefit of even the most established practices supported by research, such as prewriting and revision (Rothman, 1992).
- Reading and writing are mutually facilitative skills, which should be taught together.  Writing also gives children a feeling of empowerment and ownership over the words they learn, increasing their motivation to learn more (Clark & Uhry, 1995).
- Emphasis on writing activities is repeatedly shown to result in special gains in early reading achievement (Adams, 1990).
- First-grade writing is affected by some of the same factors as reading.  In first grade, writing ability is highly correlated with word recognition, and reading comprehension becomes increasingly correlated with writing ability as the grades progress (Honig, 1996).
- For students who have developed problems in the writing process, teachers should focus on composition and de-emphasize the mechanical aspects of spelling, word usage, and style until students build confidence in their writing abilities (Krashen, 1993).
- Too many schools continue to substitute inferior activities for actual reading and writing during the large block of time that is devoted to language arts (Schmoker, 1996).

- Both learning to read and learning to write involve the child in constructing increasingly sophisticated strategies or rules (Weaver, 1994).
- There are many skills beginning writers have to address at the same time as they compose. These skills should be taught as children are learning to communicate effectively in writing, not before they are asked to write. In essence, they learn by doing (Campbell & Parker, 1992).
- Writing with a computer can encourage a child to stay with a writing piece longer. It can make revising more accessible and promote *collaboration (Write on Track-Write Source Program,* 1996).

## Strategies

- **Beginning writing involves the following skills:**
  1. Organizing paragraphs so that they present a single topic.
  2. Writing with fluency and then rereading for errors.
  3. Applying basic rules of grammar and style.
- **Good writing** is clear, expressing what the writer wishes to express. It is efficient and not redundant. Good writing follows the basic rules of grammar and the rules of modern writing style.
- *Seeing With New Eyes: A Guidebook on Teaching & Assessing Beginning Writers,* summarizes the six traits of good writing as follows:
  1. **Ideas**—The idea of a writing is the main thesis (topic) of the piece, documented by supporting details and elaboration. Students should be encouraged to be "gatherers and collectors" of information which will help them enhance their ideas with clear, interesting details.
  2. **Organization**—The organization of a writing is the inner structure which holds the piece together. A well-organized piece has a sense of a beginning, ending, and strong details that provide necessary support. Sequencing (chronological order) as well as grouping (putting information together) are essential in organization.
  3. **Voice**—Voice is the ability of the feelings and thoughts of the writer to come through the writing. This allows the writer's emotion and individuality to emerge.
  4. **Word Choice**—Word choice is the use of precise, rich language that communicates to, enlightens, and allows the writer to express thoughts clearly. Effective word choice is dependent upon the ability of the writer to use language in a natural or unexpected way. It is not only dependent on an exceptional vocabulary.
  5. **Sentence Fluency**—Sentence fluency is the "rhythm and flow" the language exhibits in a writing piece. This may include the use of more complex sentences and word strings to form sentences.
  6. **Conventions**—The conventions of a piece of writing include anything that a proofreader would notice, such as capitalization, punctuation, grammar, spelling, etc.
- The five steps in the **writing process** are defined as follows:
  1. **Prewriting**—Prewriting is an essential part of good writing. It involves searching for and selecting a topic, planning writing, and shaping and focusing the topic.
  2. **Drafting**—Writing the first draft is the second step in the writing process. It involves getting ideas down on paper, establishing a focus for writing, and organizing the supporting ideas.
  3. **Revising**—Revising involves turning a first draft into a more complete piece of writing by making big changes in order to improve the ideas.
  4. **Editing**—Editing involves line-by-line changes and corrections which turn revised writing

into clear, accurate copy.

5. **Publishing**—Publishing is the final step of the writing process in which a finished piece is shared with an audience. Some forms of publishing include oral reading, displaying the work for others to see, submitting it to a magazine or contest, etc.

• To prepare for the **Florida Writes Assessment**, Amy Kaiman (1997) suggests that the well-organized paper should be structured as follows:

## Introduction

*Paragraph One:*
This is where the main idea of the response should be stated. An introduction tells the reader what the response will be about. The main idea of the essay is expressed in the main topic sentence. The rest of the paragraph gives at least three details or reasons that support the main topic sentence. These three details will be developed in the body of the essay.

## Body

*Paragraph Two:*
The first detail expands and supports the main idea and is contained in the topic sentence of paragraph two. The rest of the sentences support the topic sentence by giving facts, reasons, incidents, examples, or statistics to back up the main point.
*Paragraph Three:*
The second detail is contained in the topic sentence of paragraph three. The rest of the sentences in this paragraph support the topic sentence by giving facts, reasons, incidents, examples, or statistics that back up the main point.
*Paragraph Four:* The third detail is contained in the topic sentence of paragraph four. The rest of the sentences in this paragraph support the topic sentence by giving facts, reasons, incidents, examples, or statistics that back up the main point.

## Conclusion

*Paragraph Five:* The conclusion summarizes all main points. The topic sentence of the concluding paragraph should tie all the points together.

**Basic Three-Paragraph Beginning Essay**
Sometimes the body or middle (supporting part of the paper is only one or two paragraphs instead of three, especially for younger writers, as in the following structure:
*Paragraph One:* Introduction with topic sentence
*Paragraph Two:* Body with statements of support, reasons, examples, etc.
*Paragraph Three:* Conclusion

• Kaiman also suggests that students should be taught the four "elements" or parts of the whole which will determine the student's score.

1. **Focus**—The essay will be evaluated on its focus, or how well the writer sticks to the subject while expressing ideas. To evaluate the essay for its focus, the student should ask these questions:
   —Is the whole essay about the main idea?
   —Do all the supporting details relate to the topic as a whole?
   —Can any extra information that does not relate to the topic be taken out?
   —Does the writing focus on the main idea or does it get sidetracked and lose sight of the main topic?

2. **Organization**—The essay will be read to see how organized it is. Organization means having a clear structure (a beginning, middle, and end). To evaluate the essay for organization, the student should ask the following:

   —Is the position or topic clearly stated in the introduction?

   —Is there a distinct beginning, middle, and end to the essay?

   —Is it clear to the reader what the key points are, and which details support them?

   —Do the sentences connect to each other?

   —Are there appropriate transitions between one idea and the next?

   —Does the conclusion clearly summarize all the key ideas that have been presented?

3. **Support**—The readers will look for details in the essay that support the main idea. To evaluate the essay for support, the student should ask:

   —Are specific examples and illustrations of ideas provided?

   —Are appropriate facts, reasons, incidents, examples, or statistics to support the ideas or explain the main point of view included?

   —Does the choice of words help the reader to clearly understand the points?

4. **Conventions**—Conventions refer the basic rules of grammar and spelling. To evaluate the essay for conventions, the student should ask:

   —Have all the sentences been punctuated properly?

   —Are all the words spelled correctly?

   —Are all sentences complete?

   —Have a variety of sentence structures been used?

- Prompts for the **Florida Writes Assessment** will require either narrative or expository writing for fourth grade and persuasive or expository for eighth and tenth grades. These writing types are defined as follows:

1. **Narrative**—Narrative writing tells a story of some kind. The details should answer the 5W's (Who? What? When? Where? and Why?) about the event or experience. A narrative could retell a memorable event or an important experience.

2. **Expository**—Expository writing gives information that explains a subject, gives directions, or shows how to do something. Cue words are *how, why* or *what*. Transition or linking words such as *first, second, then*, and *finally* are especially important in expository writing to help the reader follow the sequence of ideas.

3. **Persuasive** —Persuasive writing argues for or against a subject. It is important to include enough facts, details, and supportive evidence to convince the reader to accept the writer's particular point of view on the subject.

**Power Writing Strategies** (by Betty Hamilton and Associates):

- Place intense emphasis on organization and structure as a base for writing. With the mastery of that base, writers can then elaborate, vary, and create to meet the specific communication needs of their reading audience.
- Embody some or all of the components of the writing process (prewriting, drafting, sharing, revising, editing, assessing, and/or publishing) depending on the purpose of the writing.
- Solve the writer's frequent problem of *how* to say it and in *what* order.
- Incorporate the teaching of mechanics and conventions *during* the writing process—*not* as skills taught in isolation.
- Remind the teacher and learner that writing is a process—*not* a subject.

**Empty Pages** (Fadiman C., & Howard, J.) suggests ways to help young students learn to write:
- **Make speaking carefully a habit.** Speaking to children is important, and so is conversing with them. Parents and teachers who do converse in meaningful discourse give them a real advantage.
- **Reading aloud** does more than provide subjects for conversation. Such reading often kindles young listeners' imaginations almost magically. In addition, it can give them an affection for particular words or words in general. It may instill a feeling for the way words fit and work together, which is of transcending importance in good writing.
- **Simple word games and riddles** delight the very young and give them interest in, and familiarity with words.
- **Reverse dictation.** The child, not yet a writer, tells a story to the teacher, who writes it down, then hands it back, and there it is, the child's own story, preserved, fixed forever, repeatable, showoff-able. This little ploy often carries the seed of writing motivation.
- **Daily language workouts,** in which one or two sentences are written on the board at the beginning of each class period, provide students with opportunities to review basic writing and language skills. These sentences contain mechanics, usage, and grammatical errors to correct (*Write Source 2000*, Daily Language Workouts 1996).
- **Daily writing practice** helps students practice their writing skills. This is an opportunity for students to write freely and rapidly in response to a stimulation prompt, photograph, or graphic. Writers can then share their discoveries in follow-up sessions. They can also continue working on their writing, shaping it into a finished narrative or *essay (Write Source 2000*, Daily Language Workouts, 1996).
- **Model the writing process for students.** "I do. We do. You do." (Archer 1998). If we want our students to know that writing is a process of the revising and editing, and making a mess, and that having problems and getting things wrong are natural parts of writing, we must demonstrate the process for them (Phoenix, 1990).
- **Teach students mnemonics and formulas** for writing fourteen sentence patterns within the four types of sentences: simple, compound, complex, and compound-complex. (See *Strategies Intervention Model* in **Instructional Resources** section.)
- **Teach students the skills of paragraph writing** according to a sequence of instructional stages that have been found to be effective in teaching strategies to students.
- Using the research-based instructional stages, teach **topic, detail, and clincher sentences. Point of view, tense,** and **transition words** practice opportunities are essential for teaching paragraph writing. (See *CRL-Edge Enterprises*, University of Kansas in **Instructional Resources** section.)

# Assessment
- In the book, *Seeing with New Eyes*, there is a 6-trait Assessment for Beginning Writers. Beginning writers are classified as (1) Experimenting, (2) Emerging, (3) Developing, (4) Capable, and (5) Experienced. They are judged by the following six traits: (1) Ideas, (2) Organization, (3) Voice, (4) Word Choice, (5) Sentence fluency, and (6) Conventions, explained in the Strategy section. For a copy of the assessment tool, please see the **Appendix**.
- Rubrics for assessing students' writing, from the Center for Performance Technology, have been developed for teachers of the state of Florida. A copy of some of the rubrics are also in the **Appendix**.

# Instructional Resources

## Reading Programs

***Accelerated Reader***

The Accelerated Reader (AR) program combines the use of great children's literature with the use of computer software to test comprehension. The software follows individual students as well as whole class performance and also manages the records. All students, including mainstreamed, exceptional education, and gifted students may benefit.

Accelerated Reader features trade book reading with extensive practice reading time (ideally at least 60 minutes a day) as its core concept. The program uses a computerized reading management system. AR provides book lists totaling over 16,000 titles of widely acclaimed books. Students select a book to read from the recommended book list. Once students read their selected book, they take a test, via the computer, on the book just read. The computer scores the test, awards the students points based on test performance, and keeps a complete record of the results. Students must score at least 60% on the test to earn any points. The point scale is 10 for a perfect score of 100%, 9 for 90%, etc. Careful test writing and internal security features guard against student cheating.

**Grade levels**:     K-12
**Contact:**          Advantage Learning Systems, Inc.
                      P.O. Box 8036
                      Wisconsin Rapids, WI 54495-8036
                      1-800-338-4204 or 1-715-424-4242
                      http://www.advlearn.com

***The Book of Kids Songs- A Holler-Along Handbook***

This book, by Nancy & Jim Cassidy, 1986, is a collection of songs for children to sing and enjoy. Lots of humorous rhymes.

**Grade levels**:     K-2
**Contact:**          Klutz Press,
                      2170 Staunton Ct
                      Palo Alto, CA 94306

***Corrective Reading (SRA)***

SRA's Corrective Reading programs have features that have demonstrated through research studies to be effective in improving student performance. Each level of Corrective Reading is a core program, not supplementary material. All words, skills, and strategies are taught through direct instruction. Each level is based on cumulative skill development. Because of the cumulative development of skills, the difficulty of material increases gradually but steadily.

**Grade levels**:     3-12
**Contact:**          SRA Southeastern Region
                      8936 Western Way, Suite 5
                      Jacksonville, FL 32256
                      1-800-457-4299

***The Four Blocks***
The Four Blocks is a balanced reading approach to reading and writing developed by Patricia Cunningham (Wake Forest University) and Dottie Hall (Clemons Elementary School, Winston Salem, North Carolina). The Four Blocks uses multi-level activities in the areas of Guided Reading, Self-Selected Reading, Writer's Workshop, and Word Activities. The video has several teachers at three different schools using the multi-level activities, which make use of the concepts and techniques from their books, *Classrooms That Work and Phonics They Use*.
**Grade levels:**    K-2
**Contact**:            I.E.S.S., Inc., 1-800-644-5280

***Great Leaps Reading***
This manual, by Mercer & Campbell, is designed to help boost the reading progress of primary grade students—beginning readers as well as those at-risk for reading failure. *Great Leaps Reading* supplements the teacher's ongoing reading program. Sound awareness activities, letter recognition and phonics activities, lists of high-frequency words and phrases, and stories are included.  In addition, procedures for assessing fluency is built into the program.
**Grade levels:**    K-2
**Contact**:            Diarmuid, Inc.
                          P.O. Box 138, Micanopy, FL 32667
                          kuc49@aol.com    or    www.greatleaps.com


***Peabody Peer-Assisted Learning Strategies in Reading (PALS)***
Peer-Assisted Learning Strategies for Instruction in Reading (PALS-R) accommodates student diversity by *decentering* the teaching and learning process. This involves reorganizing classrooms so that, for part of the school day, students work with students and assume an active role in their own learning.

PALS is implemented 3 times per week, 35 minutes per session, for a minimum of 15 weeks. Students are paired in a structured manner according to their reading strength: stronger readers with weaker ones. Any reading material can be used, including basal texts, novels, and library and content area books. PALS materials are concrete, specific, and user-friendly. Repeated evaluations of PALS Reading indicate that mainstreamed students with learning disabilities, low-performing students without disabilities, average-achieving students, and high-achieving students make greater progress in reading in PALS classrooms than in typically structured classrooms.
**Grade levels:**    K-8
**Contact**:            Douglas Fuchs, PhD and Lynn Fuchs, PdD, Co-Directors
                          Kennedy Center Institute on Education & Learning
                          Box 328 Peabody College
                          Vanderbilt University, Nashville, TN 37203-5701
                          615-343-4782,   http://www.vanderbilt.edu/kennedy

***Phonemic Awareness in Young Children***
This guide, by Adams, Foorman, Lundberg and Beeler, is a classroom curriculum for teaching young children how to listen and rhyme; hear and find initial, medial, and final sounds; and become aware of phonemes and syllables. Lessons for teaching students to blend, analyze, and synthesize sounds and syllables are included, as well as, methods to assess phonemic awareness, games to teach phonemic awareness, suggested schedules for teaching, and accompanied materi-

als and resources.
**Grade levels:**    K–1
**Contact:**             Paul H. Brookes Publishing Co.
                            Post Office Box 10624
                            Baltimore, MA 21285-0624

### Reading Mastery (SRA)

Reading Mastery is part of SRA's Direct Instruction program, which attempts to provide the careful instruction needed to teach basic skills. It is a complete basal reading program intended for students in the first through sixth grades. A few simple principles have guided the program since its inception in the 1960's, and they have played a large part in its resounding success. All instruction is direct and unambiguous; tasks and activities are specified in detail. Every reading skill and strategy that students need is specifically taught, applied, and reviewed. Students receive consistent daily practice in reading, writing, listening, and speaking. Assessment is continuous; errors are corrected the instant they occur.
**Grade levels**:    1–6
**Contact:**             SRA Southeastern Region
                            8936 Western Way, Suite 5
                            Jacksonville, FL 32256 1-800-457-4299

### Reading Recovery

Reading Recovery is a supplementary, one-to-one intervention program for the least able readers in the first grade to help them acquire and use fundamental reading and comprehension skills. Students are identified by a comprehensive battery of individually administered diagnostic instruments.

Reading Recovery reduces reading failure through early intervention and helps children become independent readers. The goal is to bring the children to the average of their class or school by providing individually tailored 30-minute lessons. The specially trained teacher and child work together daily for one half-hour, in which the child is involved in reading and writing experiences.

Techniques include the reading of many *little* books to build confidence, daily writing, the re-reading of favorite books, and learning to hear sounds in words by writing simple stories. Reading Recovery focuses on providing opportunities for children to make their own links between reading and writing and to discover meaning. The integrated reading and writing lessons are tailored to build on what the child already knows while strengthening a self-improvement system, which leads to continuing growth. The elements of the lesson are the same for each child, although the content differs with each child.
**Grade level:**    1st grade
**Contact**:           Dr. Carol A. Lyons, Gay Su Pinnell, or Dr. Diane E. DeFord
                            Reading Recovery Program, The Ohio State University
                            200 Ramseyer Hall
                            29 West Woodruff Avenue, Columbus, OH 43210
                            1-614-292-7807

### *Reading Test Success*

This program is designed to help middle level students prepare for multiple-choice reading tests. Reading Test Success develops critical reading skills students will use throughout their school years.

**Grade levels:** 5–9
**Contact**: Great Source
181 Ballardvale Street
Wilmington, MA 01887
1-800-289-4490

### *Touchphonics*

This is a manipulative *multi-sensory* system used to teach phonics. Its special feature is the use of 200 color-coded letters and letter combinations called "touch-units©." Students use visual, auditory and tactile modalities to help increase the understanding of the structure of words without drill.

**Grade levels:** K–6
**Contact:** Touchphonics Reading Systems, LLC
4900 Birch Street
Newport Beach, CA 92660
1-800-92-TOUCH or 714-975-1141
Fax: 714-975-1056

# Vocabulary & Spelling

### *Clarifying Routine*

This guide from Edge Enterprises, Lawrence, Kansas 66045, provides an instructional strategy for teaching vocabulary and meaning.

**Grade levels:** 6–12
**Contact:** FDLRS, 850-487-2630, for training and materials

### *How to Teach Spelling*

This resource manual, by Rudginsky and Haskell, based on the Orton-Gillingham approach to reading and spelling is for teachers who want their students to learn: 1) to recognize the sounds in the English language, 2) to decode words, and 3) to spell words correctly by relying on spelling rules and generalizations rather than on memory. Lists of words and phrases and sentences for dictation are provided in the teacher's manual. Four student workbooks can also be purchased.

**Grade levels:** 1–12
**Contact:** Educators Publishing Service, Inc.
31 Smith Place
Cambridge, Massachusetts 02138-1000

### *Spell It Myself*

A system of teaching spelling that is based on practices used in New Zealand for 30 years has been adapted for American schools by the author. This book includes individualized spelling lists based on the most frequently used word lists, group spelling activities, and peer study and testing.

**Grade levels:** K–12
**Contact:** A Sage Publications Co.
Thousand Oaks, CA

### Teaching Kids to Spell

This book, by Richard Gentry, discusses the theory of teaching spelling, invented spelling and choosing spelling words. The appendix has list of the origins of English words, word lists, organized according to sounds and letters, most frequently used words in children's writing, and students' most commonly misspelled words.
**Grade levels:** K-12
**Contact:** Heinemann Publishers
361 Hanover Street
Portsmouth, NH 03801-3912

### Vocabulary Cartoons

This book teaches "vocabutoons," which are mnemonic cartoons designed for learning new words. Reproducible Blackline Masters are available.
**Grade levels:** 3–6
**Contact:** New Monic Books,
314-C Tamiami Trail
Punta Gorda, FL 33950
1-800-741-1295 www.vocabularycartoons.com

### Vocabulary Cartoons/S.A.T. Word Power

Using mnemonic methods, this book teaches the method of building a more educated vocabulary. Special emphasis is on words used in S.A.T., G.R.E. and other standardized tests. Reproducible Blackline Masters available.
**Grade levels:** 7-12
**Contact:** New Monic Books
314-C Tamiami Trail, Punta Gorda, FL 33950
1-800-741-1295 www.vocabularycartoons.com

### Vocabulary Connections

Vocabulary lessons built around curriculum-based, thematically organized literature and nonfiction selections provide meaningful context for essential vocabulary words. Included in the soft-cover series are vocabulary activities, writing activities, test-taking tips, and unit reviews.

Vocabulary connections software can provide independent vocabulary practice tailored to individual student needs. Lessons open with a definition, contextual sentence, and a comprehension exercise. Students then have a choice of engaging activities to reinforce word meaning, usage, and spelling.
**Grade levels:** 1-8
**Contact:** Steck-Vaughn, Austin TX
1-800-531-5015
http://www.steck-vaughn.com

### The Vocabulary Strategy
This program is designed to assist students in learning new vocabulary words using powerful memory-enhancement techniques.  Strategy steps cue students to focus on the critical elements of the concept, to use visual imagery associations with prior knowledge, and by mnemonic devices to create study cards. Ellis, Edwin S., LINCS Edge Enterprises, Inc. Lawrence, Kansas 66045 (1995)
**Grade levels**:     4-12
**Contact**:            FDLRS, 850-487-2630, for training and materials

### Vocabulary Workshop
This classic program is designed for developing and enriching vocabulary resources, promoting more effective communication in today's world, and improving vocabulary skills assessed on standardized tests.
**Grade levels:**     K-5
**Contact**:            Sadlier-Oxford, A Division of William H. Sadler, Inc.
                            9 Pine Street
                            New York, NY 10005-1002
                            1-800-221-5175

### Word Identification Strategy
Lessons in this program increase students' reading vocabulary by pronouncing words by identifying prefixes, suffixes, and stems. Students are taught to follow three short syllabication rules.
**Grade levels:**     6-12
**Contact:**            FDLRS, 850-488-2630, for training and materials

### Word Matters: Teaching Phonics and Spelling in the Reading/Writing Classroom
This book, by Fountas & Pinnell includes a chapter, A Comprehensive Word Study System, which explains how to create individual spelling lists using personal words and core words.  It describes the use of *Spelling Buddies* to teach spelling.
**Grade levels:**     K-12
**Contact:**            Heinemann Publishers
                            361 Hanover Street
                            Portsmouth, NH  03801-3912

### Wordly Wise ABC
This series of vocabulary books systematically helps students to think not only about words and how we define them, but also about the world of things and ideas for which words are referents.
**Grade levels:**     1-3
**Contact**:            Educators Publishing Services, Inc.
                            31 Smith Place,
                            Cambridge, MA 02138
                            1-800-225-5750

# Writing

*Assisting Florida Teachers: A Series of Handbooks Vol. 3*—Department of Education Handbooks

This manual assists teachers in scoring students' writing. (See **Appendix** for more information.)

**Grade levels:**    4, 8, & 10
**Contact**:         Marty Beech, Ph.D.
                   Center for Performance Technology
                   Florida State University
                   State of Florida
                   850-644-4720

*Expressive Writing I; Expressive Writing II*

The level I program teaches the most fundamental rules about translating observations into sentences, writing paragraphs that do not deviate from a topic and editing the works of others, as well as one's own work.

Level II focuses on writing clearly (e.g., using pronouns correctly, including details for clarity, etc.), writing with a variety of sentence structures, using quotations, and editing for clarity and punctuation.

**Grade levels:**    Level I: 3rd grade reading Level; II: 4-6.
**Contact**:         SRA
                   Southeastern Region
                   8936 Western Way Suite 5
                   Jacksonville, Florida 32256
                   1-800-457-4299

*The Four Blocks*

The Four Blocks is a balanced approach to reading and writing developed by Patricia Cunningham (Wake Forest University) and Dottie Hall (Clemons Elementary School, Winston Salem, North Carolina). The Four Blocks uses multi-level activities in the areas of Guided Reading, Self-Selected Reading, Writer's Workshop, and Word Activities. The video has several teachers at three different schools using the multi-level activities, which make use of the concepts and techniques from their books, *Classrooms That Work and Phonics They Use*.

**Grade levels:**    K-2
**Contact**:         I.E.S.S., Inc. 1-800-644-5280

*Inspiration Software*

This software provides ways to organize writing by using webs and concept mapping.  It also helps develop thinking skills.

**Grade levels**:    4-8
**Contact**:         Inspiration Software
                   7412 SW Beaverton Hillsdale Hwy.—Suite 102
                   Portland, OR 97225-2167
                   1-800-877-4292; fax:  503-297-4676
                   www.inspiration.com

*Peer Partners: Reaching the Needs of All Students*
This is a workshop package that contains instructional routines which increase active involve-
ment of each student in learning to read, write, think, and express.
**Grade levels**:     4-12
**Contact**:          Anita Archer, Ph.D. Educational Consultant
                     360-466-3907

*Power Writing*
Power Writing is a program designed to take students through the writing process. This writing
program involves the teacher and learner in three steps: (1) Learn to Write—*Guided Practice* (2)
Write to Learn—*Independent Practice* (3) Write to Show Learning—*Assessment*.
**Grade levels**:     K-12
**Contact**:           Betty Hamilton and Associates
                     Power Writing—Thinking Consultants
                     1816 Smith Road
                     Temperance, MI 48182; 1-313-847-3374

*Seeing with New Eyes: A Guide book on Teaching and Assessing Beginning Writers, 5ᵗʰ edi-*
*tion, 1999*
This book is a collection of student writings and drawings and teacher ideas, which assists
teachers in working with the beginning writer.  It summarizes traits of good writing and gives
inspiring ideas of how to respond to students' writing.  In addition it has information on assess-
ment, including portfolios.
**Grade levels**:     K-8
**Contact**:          Assessment and Evaluation Program
                     Northwest Regional Educational Laboratory
                     101 SW Main Street Suite 500
                     Portland, Oregon 97204

*SRA Reasoning and Writing*
This program teaches thinking skills as the foundation for writing skills.  A strong base for
reading comprehension and other language arts competencies are built, when using this program.
**Grade levels**:     Levels A and B: K-2; Level C: 2-3; and Level D:4-5
**Contact**:          SRA
                     Southeastern Region
                     8936 Western Way Suite 5
                     Jacksonville, Florida 32256
                     1-800-457-4299

*Stack the Deck Writing Series*
This program offers a step by step approach to the writing process. It also includes a variety of
activities on different types of writing.
**Grade levels**:     Explore the Deck (grades 1 or 2)
                     Discover the Deck (grades 2 or 3)
                     Check the Deck (grades 3 or 4)
                     Flip the Deck (grades 4 or 5)
                     Tap the Deck (grades 5 or 6)
                     Open the Deck (6 or 7)

Cut the Deck (grades 8 or 9)
Stack the Deck (9-12)
Fan the Deck (Advanced High School);
Master the Deck (At Risk and Adult Education)
**Contact**: Stack the Deck, Inc.
P.O. Box 429
Tinley Park, Illinois 60477-0429

### *Write Source Handbooks for Grades K-12*
This resource is a writing based language learning program that includes lessons in using the 5-step writing process, different forms of writing, and learning tools.  Handbooks for first grade and higher include the student almanac, which features interdisciplinary lists, graphs, tables, charts, maps, etc.  There is also a proofreader's guide, which covers the rules of grammar and mechanics, beginning in grade two.  Student workbooks and teacher's guides are available.
**Levels**: K-12
**Contact**: Great Source Education Group
181 Ballardvale Street
Wilmington, MA 01887 1-800-289-4490

# Study Skills & Content Enhancements
### *ACT Study Power  (American College Testing Program, 1987)*
Designed for high school students, this material helps improve study skills for success and preparing for tests such as the ACT.
**Grade levels:** 9-12
**Contact**: Effective Study Materials
ACT
American College Testing
Cambridge, MA

### *Assignment Completion Strategy  (The Edge Enterprises, Inc.)*
This is designed to enable students to complete and hand in assignments on time.  The Instructor's Manual provides step-by-step instructions, blank copies of the forms, and evaluations for an academic year all included.
**Grade levels:** 3-12
**Contact**: FDLRS, 850-487-2630, for training and materials

### *Crash Course for Study Skills*
This program, by Marty Soper, helps students assess and improve their individual study skills.  In addition to specific study skills like outlining, summarizing, and paraphrasing, students will learn about study tools like mnemonic devices, assignment books, and graphic organizers.
**Grade levels**: Grades 7-12
**Contact**: Lingui System
3100 4th Ave.
East Moline, IL 61244
1-800-776-4332

*Creating Independence through Student-Owned Strategies (CRISS)*
This program is designed to help students learn more effectively throughout the curriculum. It focuses on teaching students how to learn through reading, writing, talking, and listening. Students learn to apply CRISS strategies in all subject areas. The manual contains ideas and strategies, which support the CRISS workshop offered by trainers, usually from the local district.

**Grade levels:**   K-6
**Contact:**   Project CRISS
233 First Avenue East
Kalispell, MO 59901
406 756-5011
http://www.digisys.net/criss

*Critical Thinking*
This program improves students' reading, thinking, and reasoning skills, and improves performance across all subjects. Based on Bloom's Taxonomy to introduce and practice the six most important thinking skills within any content area.

**Grade levels:**   1-6
**Contact:**   Steck-Vaughn: A Harcourt Brace Company
P.O. Box 26015
Austin, TX 78755
1-800-531-5015
Fax 1-512-343-6854

*Daily Analogies*
This program uses verbal and figurative analogies to develop critical and creative thinking, improve vocabulary, and strengthen test-taking skills.

**Grade levels**:   1-8
**Contact:**   Great Source
181 Ballardvale Street
Wilmington, MA 01887
1-800-289-4490

*The Differentiated Classroom, Responding to the Needs of All Learners*
This book, by Carol Ann Tomlinson (1999), contains descriptions of actual lessons, units, and classrooms with differentiated instruction at all levels in all subject areas so that teachers can teach in differentiated classrooms.

**Grade levels:**   K-12
**Contact**:   Association for Supervision and Curriculum Development
1703 North Beauregard Street
Alexandria, VA  22311-1714
1-800-933-2723
**Local  Contact:** Beverly Robinson
Division of Teaching and Learning, Leon County Schools
Newspaper in Education
Peggy Durham, NIE Coordinator,
*The Tallahassee Democrat*  599-2134

### The Framing Routine

This guidebook, by Edwin S. Ellis (1998), focuses on how teachers can increase students' understanding of information associated with big topics, main ideas and details through guided use of a graphic organizer.

**Grade levels:**    3-12
**Contact:**             The Framing Routine
                             Edge Enterprises, Inc. Lawrence, KS 66045
                             FDLRS, 850-487-2630 for training and materials

### Language Exercises Review

This program addresses middle-school uses of dictionary skills, library skills, and process writing practice with ample reinforcement and activities.

**Grade levels:**    5-8
**Contact:**             Steck-Vaughn: A Harcourt Brace Company
                             P.O. Box 26015
                             Austin, TX 78755
                             1-800-531-5015
                             Fax 1-512-343-6854

### Learning Power

Students become more successful by showing them how to take action and develop effective study skills, time-management strategies, critical thinking skills, and relationship-building processes.

**Grade levels:**    6-12
**Contact:**             Great Source
                             181 Ballardvale Street
                             Wilmington, MA 01887
                             1-800-289-4490

### An Observation Survey of Early Literacy Achievement

This book, by Marie M. Clay, is for classroom teachers who want to be careful observers of young children learning to read and write.  It will help teachers who work with any kind of beginning literacy program to monitor the progress of their children, but for those who like to watch children in an open, relatively unsequenced program of learning to read and write, observation procedures like these are essential.

**Levels:**             Beginning and nonreaders
**Contact:**             Heinemann
                             361 Hanover Street
                             Portsmouth, NH  03801-3912

### Parallel Alternative Strategies for Students

These books are content-centered, supplemental materials designed to help secondary teachers meet the needs of students of various achievement levels.  PASS volumes provide support to secondary students with disabilities, alternative education classes, or low achieving students enrolled in regular education content courses such as history or mathematics.

The concise, easy to read text and activities found in the PASS volumes have been adapted for students who have special needs. Each PASS volume offers teachers supplementary activities and strategies to assist problem learners achieve competence in the intended outcomes of a

specific course. Teacher's guides include suggested activities, specific objectives, correlation to the course student performance standards, answer keys, quizzes, and an appendix of multimedia resources to augment the course content.

**Social Studies**

*Focus on Economics*
　　Course # 2102330 & 2102310

*Intro. To American Gov.*
　　Course # 2106300

*Intro. To American History*
　　Course # 2100300

*Intro. To World History I*
　　Course # 2109300

*Intro. To World History II*
　　Course # 2109300

**Science**

*Fundamental of Biology*
　　Course # 2000300

*Fundamentals of Earth/Space*
　　Course # 2001300

*Exploring Oceanography*
　　Course # 2001360 & 2001370

*Fundamentals of Physical Science*.
　　Course # 2003300

**English**

*English Skills I*
　　Course # 1001300

*English Skills II*
　　Course # 1001330

*English Skills III*
　　Course # 1001360

*English Skills IV*
　　Course # 1001390

**Mathematics**

*Building General Math Skills*

*High School Competency Test*

**Physical Education/Health**

*Personal Fitness*
　　Course # 1501300

*Life Management Skills*
　　Course # 0800300

**Local Contact**:　Educational Products Distribution
　　　　　　　Florida Department of Education
　　　　　　　Collins Building, Room B-1,
　　　　　　　Tallahassee, FL  32299-0400

*Precision Teaching (Measurement)*

Precision Teaching is a method designed to help remediate students. The students are timed, and the curriculum is written in Precision Teaching terminology in order to help teachers teach specific skill deficits, identify intake-output channels, and make each skill measurable.

**Grade levels:** K-12

**Contact**:　　Department of Education, Division of Public Schools
　　　　　　Bureau of Education for Exceptional Students, Tallahassee, FL

*Skills for School Success*

This program provides research-based, teacher-directed instruction of study skills that transfer across the curriculum, including school behavior and organization skills, learning strategies, textbook reference skills, reading and interpreting graphs, and dictionary and encyclopedia reference skills.

**Grade levels**:　　3-6

**Contact:**　　Curriculum Associates, Inc.
　　　　　　P.O. Box 2001
　　　　　　North Billerica, MA 01862-0901

1-800-225-0248
Fax: 1-800-366-1158
FDLRS, 850-487-2630, for training and materials

### Advanced Skills for School Success
This program teaches skills at the secondary level, including school behavior and organizational skills, completing daily assignments, effective reading of textbooks, learning from verbal presentations, and participating in discussions.
**Grade levels:** 7-12
**Contact**: Curriculum Associates, Inc.
P.O. Box 2001, North Billerica, MA 01862-0901
1-800-225-0248; Fax: 1-800-366-1158; FDLRS, 850-487-2630

### SLANT: A Strategy for Class Participation
This is a simple, easy to teach strategy designed to help students participate in class discussions and presentations. Students learn how to use appropriate posture, track the talker, activate their thinking and contribute information.
**Grade levels:** 2-12
**Contact:** CRL-Edge Enterprises,
University of Kansas, Lawrence, Kansas
FDLRS, 850-487-2630, for training and materials

### Specific Skill Series
This program is structured around the teaching of nine key comprehension skills to provide intensive practice with working within words, following directions, using the context, locating the facts, detecting the sequence, identifying inferences, and getting the main idea.
**Grade levels:** Pre K–8
**Contact:** SRA
Southeastern Region
8936 Western Way, Suite 5
Jacksonville, FL 32256
1-800-457-4299

### Starting Early With Study Skills—A Week-By-Week Guide for Elementary Students (Irvin, J. & Rose, E., Longwood Division, Allyn and Bacon)
This book is consistent with research in learning and remembering; concepts such as schema and metacognition pervade suggested classroom and student activities.
**Grade levels:** 1-5
**Contact**: Rose Speech & Academic Center
1268 Timberlane Road
Tallahassee, FL 32308
850-893-8743

### Strategies Intervention Model (SIM)—The Content Enhancement Series
These step-by-step instructional guides assist teachers in helping students to organize their work in "learner-friendly" ways. Specifically, the guidebooks have been designed to help teachers enhance the ways they present content and improve students' ability to organize, understand, and remember critical information. Some of the strategies include: *The Clarifying Routine*, *The Starter Vocabulary Strategy*, *The Vocabulary Strategy LINCS*, *Sentence Writing Strategy*, and

*Paragraph Writing Strategy.*
**Grade levels:**    3-12
**Contact**:    Don Deschler
            Center for Research on Learning (C-R-L) Edge Enterprises
            University of Kansas
            Lawrence, Kansas
            785-864-4780
**Local contact:**    Bev Simpkins
            Cobb Middle School, Leon County Schools, 850-488-3364
            FDLRS, 850-487-2630, for training and materials

### *Study Skills*
This guide provides focused practice in the research and study skills that improve performance on class work, homework, library work, and tests.
**Grade levels:**    3-6
**Contact**:    Steck-Vaughn: A Harcourt Brace Company
            P.O. Box 26015
            Austin, TX 78755
            1-800-531-5015, Fax: 1-512-343-6854

### *Teaching Reading in the Content Areas: If Not Me, Then Who? (Second edition)*
This resource, by Rachel Billmeyer, Ph.D., contains many strategies and tools to help students understand and organize information from print.  The program includes 40 innovative instructional strategies to improve students' understanding when reading for content. It also provides many easy to use checklists, semantic maps, charts, and graphic organizers on blackline masters.
**Grade levels:**    3-12
**Contact:**    McREL Resource Center
            2550 S. Parker Road, Suite 500
            Aurora, CO 80014
            303-337-0990
            Fax:  303-337-3005

### *Teaching Study Strategies to Students with Learning Disabilities*
This guide has ready-to-use reproducibles, teaching plans, and resources for middle to high school.
**Grade levels:**     6-12
**Contact:**     Longwood Division, Allyn and Bacon Publishers
            160 Gould Street
            Needham Heights, MA 02194-23
            FDLRS, 850-487-2630, for training and materials

### *The Test Taking Strategy*   (The Edge Enterprises, Inc.)
This strategy provides students techniques on taking tests such as allocating time and priority to each section of a test, carefully reading important elements in the test instructions, recalling information by accessing mnemonic devices, and systematically making well-informed guesses.
**Contact**:    FDLRS 850-487-2630, for training and materials

# Aa Bb Cc

$$+\begin{array}{r} 2 \\ 2 \\ \hline 4 \end{array}$$

# Mathematics

# Mathematics

## Introduction

*"Children will become confident "doers"*
*of mathematics only if mathematics makes sense to them and if they*
*believe in their ability to make sense of it."*

—Trafton and Claus, 1994

"Mathematics: from the Greek, **to learn.** It is the study of relationships (between numbers, between shapes), a search for pattern and order, and an attempt to make sense of the world. This study involves making connections, seeing patterns, seeing order, using logic, making predictions, creating hypotheses, proving theorems, solving problems." (*Everyday Learning Corporation* presentation, July 1994).

Students often do not see any relationship between the mathematics they learn in school and the other subjects they study. As a result, many students do not see or understand the connection between mathematics and their daily lives. Some students may excel at performing mathematical functions, but there is evidence that they cannot apply those skills to solve everyday problems.

Because it develops in multiple settings, math ability can be used to solve problems in many different contexts and environments. Students should experience the ways that mathematical approaches to issues and problems can help them think through topics and problems in their other classes. Mathematics should not be isolated from other school subjects or the everyday lives of students. Iran-Nejad, McKeachie, and Berliner (1990) state, "The more meaningful, the more deeply or elaborately processed, the more situated in context, and the more rooted in cultural, background, cognitive, and personal knowledge an event is, the more readily it is understood, learned, and remembered (p. 511)."

Florida educators have identified five math strands in which students should become proficient. The following math strands are explained to help teachers have a clearer understanding of their meanings.

## Strand A: Number Sense

Number sense can be described as an intuition about numbers and their relationships. This includes having a feeling for comparisons among numbers, a knowledge of the effects of various operations on numbers, the ability to represent numbers in several ways, and the skills to interpret and use numbers from real-world situations (Florida Curriculum Framework—Mathematics).

Students with number sense pay attention to the meaning of numbers and operations and make realistic estimates of the results of computation. They possess an accurate notion of how numbers relate to each other and how those numbers provide information about the real world. They can discuss which size unit will be convenient to use when measurements are to be taken, and they seem to be intuitively aware when an answer is "out of the ballpark."

A student with number sense understands both the relationships between numbers and the effects of operations on numbers.  Since this aspect of number sense develops slowly over many years and is very dependent on the experiences a child has had, a wide disparity may exist among the concepts and skills of students, especially at the upper grade levels (NCTM—Curriculum and Evaluation Standards for School Mathematics Addenda Series).

The NCTM Standards define number sense as involving the following components:
- Well-understood number meanings
- Multiple relationships among numbers
- Recognition of the relative magnitude of numbers
- Knowledge of the effect of operations on numbers
- Reference to measures of things in the real world

# Strand B: Data Analysis and Probability

Data analysis and probability permeate almost all disciplines and is an avenue through which children can explore the world around them.  Children learn to locate, gather, organize, manipulate, summarize, display, and analyze large quantities of information, which they can use for prediction and interpretation and/or for further study.

Data analysis and probability include the following components:
- Understanding and using the tools of data analysis for managing information
- Identifying patterns and making predictions from an orderly display of data using concepts of probability and statistics
- Using statistical methods to make inferences and valid arguments about real-world situations

# Strand C: Measurement

Measurement activities give children many opportunities to explore, organize, and make sense of their world as well as to provide for active participation in and exploration of topics in other disciplines.  Relationships of numbers to real-world quantities and measures and the use of numbers in simple estimations can help children develop the flexible, intuitive ideas about numbers that are most desired.  Students who grow up recognizing the complexity of measurement may be less likely to unquestionably accept many of the common misuses of numbers and statistics (Sunshine State Standards and *Elementary and Middle School Mathematics*, John A. Van de Walle).

Measurement includes the following components:
- Experiences with geometric quantities (length, area, volume)
- Experiences with arithmetic quantities (size, order, labels)
- Experiences with dynamic variables (discrete, continuous, chaotic)

# Strand D: Geometry and Spatial Sense

Geometry is the study of objects, motions, and relationships in a spatial environment. The world of geometry is the world of patterns, shapes, and movement. Geometric activities are valuable because they not only develop spatial and geometric ideas, but they also promote exploration and reasoning.

Spatial sense is often referred to as spatial perception or spatial visualization and can be characterized by a number of such spatial abilities as the ability to imagine movement or spatial dis-

placement by mentally rotating, folding, or in some other way manipulating visual representations of objects. The fundamental ideas of sliding and turning are basic to every child's spatial explorations, and putting these notions into a geometric context should be the starting point for a child's mathematical development in the earliest grades.

Geometry and spatial sense include the following components:
- Experiences that focus on geometric relationships
- Experiences that focus on the direction, orientation, and perspectives of objects in space
- Experiences that focus on relative shapes and sizes of figures and objects.
  (NCTM 1989)

## Strand E: Algebraic Thinking

Algebra is a way of thinking. It is a language used to express mathematical relationships. Students need to understand how quantities are related to one another and how algebra can be used to express and analyze those relationships. They need to focus on understanding the relationship between the equation and the graph and on what the graph represents in a real-life situation. Algebraic thinking should begin in kindergarten with concepts such as finding patterns and guessing missing numbers and continue through 12th grade.

Students observe and describe many kinds of patterns in the world around them. They draw upon these experiences to explore properties of algebraic relations. The exploration of functional relationships leads to understandings of cause and effect relationships essential to solving many real-world problems.

Students can model problems and find solutions based on observed patterns and relationships, expressing the process symbolically and verbally. As students develop confidence in representing and solving problems, they should extend these skills to more abstract and symbolic representations.

Algebraic thinking includes the following components:
- Represent situations verbally, numerically, visually, and symbolically
- Understand the essence of equality and inequality, including the effects of operations
- Describe and generalize relationships and patterns using words, symbols, and variables
- Graph in the coordinate plane, and intuitively use language that will later be formalized (axis, slope intercept, etc.)
- Understand the similarities and differences between arithmetic and algebra as mathematical languages

# Elements of Mathematical Learning

As a result of our research findings, six major themes or categories emerged as areas of emphasis for teaching/remediating mathematics. Each area will be briefly explained here, with the more substantive information coming in each of the sections. Each section will contain research and strategies for that topic.

# Diagnose/Prescribe

This section addresses the different ways that teachers can assess and diagnose student deficiencies in math. Diagnosis is the most fundamental way of understanding a child's progression in learning mathematics. When prescribing remediation for a student, it is imperative to make sure that prescription is in alignment with a child's natural mathematical progression. Failure to do so will isolate segments of learning and make total understanding and mastery difficult.

# Concrete—Representational—Abstract (CRA)

In order for students to truly grasp math concepts, a natural progression exists from concrete to representational to abstract. Students must actually manipulate materials to understand mathematical concepts. Without this concrete conceptual understanding, students are rarely able to then understand and have the ability to think representationally or abstractly. Showing the bridge from concrete experiences to representational experiences and eventually to abstract experiences is essential.

# Learning Strategies

No single learning strategy is effective for a group of diverse mathematical learners. It is important to employ various techniques based on students' understanding of math and the experiences that they bring with them. The strategies used should be authentic, purposeful, and give meaning to real world situations. This section offers a variety of sound methods appealing to all modalities to help students learn and succeed in math.

# Communicating Math

In the age of multiple student assessments, children and teachers must be able to effectively communicate about math. Children should be able to not only express themselves orally, but they also should be able to communicate effectively using the written word. Communicating effectively enhances students' understanding of math concepts and skills both in the classroom and in the real world.

# Practice and Homework

Practice and homework are important as long as they are valuable to the students' mathematical development. Practice becomes meaningful when there is immediate corrective feedback; otherwise, students will reinforce their own mistakes. Practice is also beneficial as a review tool, especially for students who have problems with short-term or long-term memory. Homework is most beneficial when it is related to material currently being taught.

# Equity/Success for All

The educational experiences in the classroom should support equal access to achievement and participation in mathematics for all students regardless of their gender, ethnicity, race, or socioeconomic background. Educators must provide a learning environment that accepts children's knowledge of mathematics, even though it may be informal and only apply in particular settings. The focus is to teach students mathematics by building on their existing knowledge and their learning styles.

# I. Diagnose and Prescribe

*"How a student learns is as important as what a student learns. What a student learns depends on how the student learns it."*

—NCTM Curriculum and Evaluative Standards

## Research

- Research supports that assessment is necessary to identify patterns of strengths and weaknesses (Raborn, 1995).
- Teacher observations should be integrated into appraisal of students' ability and performance in math (Raborn, 1995).
- Teachers should pretest, teach, retest, and then assign materials based on new needs (Howe and Kasten, 1992).
- Difficulties and minor misunderstandings accumulate over time, compounding and making math seem more difficult (Herman, 1993).
- Rivera and Bryant (1992) note the importance of conducting a process assessment to determine the strategies that students use to determine answers.
- In many school systems, remedial services are provided almost exclusively on the basis of children's reading difficulties (Badian, 1983).
- Despite screening, few children are provided substantive assessment and remediation of their math difficulties (Goodstein & Kahn, 1974).
- In today's world, mathematical knowledge, reasoning, and skills are no less important than reading ability (Paulos, 1989; Steen, 1987; Stevenson, 1987).

## Strategies

- Identify skill deficiencies from student Academic Improvement Plan (AIP) and Individual Education Plans (IEP).
- Identify individual skill deficiencies using diagnostic tools (see below).
- Continually monitor progress using informal teacher-student conferences and assessments, post-tests, and standardized test scores.
- Reading difficulties should not impact assessment of math strengths and weaknesses. Use diagnostic tools such as interviews and observations to assess what students know and how they think about math.
- Have assessment be an integral part of teaching.
- Use assessment results to modify and plan instruction.
- *Diagnostic tools*: concrete manipulation, teacher observation, interviews, checklists, portfolios, projects, math journals, computer task/analysis, error analysis, and formal assessment

# Selected Diagnostic Math Tests

*Test*
*Grade Levels*

- **Accelerated Math** 3-adult

Advantage Learning Systems, Inc., P.O. box 8036, Wisconsin Rapids, WI 54495-8036
800-890-1472
FAX 715-424-4242
www.advlearn.com

> Provides objective mastery information, not normative data. Students work assessments or practice assignments with paper and pencil, then scans answers into the computer (Macintosh or Windows). This software automatically scores the assessment and provides immediate, specific individualized feedback and diagnostic reports to student and teacher.

- *Brigance Diagnostic Comprehensive Inventory of Basic Skills-Revised* PK-9

(Brigance, 1999)
Curriculum Associates Inc., 153 Rangeway Rd., PO Box 2001, N. Billerica, MA 01862-0901
800-225-0248
www.curriculumassociates.com/publications/cibsr.shtml

> The revised version of Brigance asesses specific areas of educational need, facilitates development of performance goals, provides indicators of progress on specific skills, facilitates reporting to staff and parents, is normed in key skill areas for multidisciplinary or classroom-based administration. Provides options for group testing and offers pretests and post tests for many skill assessments.

> Skill areas assessed: Readiness, Speech, Listening, Word Recognition, Oral Reading, Reading Comprehension, Word Analysis, Functional Word Recognition, Spelling, Writing, Graphs and Maps, Numbers, Number Facts, Computation of Whole Numbers, Fractions/Mixed Numbers, Decimals, Percents, Time, Money, Measurement/Geometry.

- *Key Math Revised: Inventory of Essential Skills* K-9

(Connolly, 1988)—Basic concepts, operations, and applications
American Guidance Service, 4201 Woodland Rd., Circle Pines, MN 55041-1796
800-328-2560; Fax: 612-786-9077
www.agsnet.com/productview2.asp?GroupID=a26060

> *Key Math Revised* is based on a comprehensive content scope and sequence and is composed of 13 subtests in three areas. Administration time is about 35 to 50 minutes. Spring and fall norms are given, and two parallel forms are available. Derived scores for the three area composites and total test include standard scores, grade and age equivalents, percentile ranks, and stanines. *Key Math-R ASSIST* software is available to provide quick derived score conversion as well as suggestions for remedial instructions.

- *Mathematics Screening and Placement Tests* 4-9
Whole number and decimal addition, subtraction, multiplication, and division; percents; geometry; algebra; and equations
Steck-Vaughn Publishing Company
800-531-5015
www.steck-vaughn.com

  Not a standardized assessment but suitable for inexpensive, classroom use. Includes a quick screening test (30-questiion) that gives placement information in an hour, two long forms (100 questions each) that can be used as pre- and posttests.

- *Sequential Assessment of Mathematics Inventory* K-8
(SAMI) (Reisman, 1985)
Mathematics language,  computation, word problems, ordinality, number and notation, measurement, geometric concepts, and mathematical applications
Harcourt Brace Educational Measurement, 555 Academic Court, San Antonio, TX 78204-0952.
www.hbem.com/trophy/mathtest/sdmt4.htm

  The classroom survey tests provide a profile of student performance in math concepts and skills, and the individual assessment battery gives an in-depth evaluation.  The test covers 300 objectives organized into eight strands, and items are sequenced from easy to difficult.  In addition to the norm-referenced items, SAMI provides follow-up probes to test the student's grasp of the material at various cognitive levels, including the concrete level.  Manipulative materials included in the concrete materials kit can be used with the probes for diagnosing concrete representation.  SAMI offers three types of test activities (paper/pencil, oral interview, and concrete representation) to provide a well-rounded picture of the student's strengths and weaknesses in math skills.

- *Slosson-Diagnostic Math Screener* (S-DMS) 1-8
(Erford & Boykin)
Conceptual development, problem-solving, and computation skills
Slosson Educational, Publications, Inc., PO Box 280, East Aurora, NY, 14052-0280,
1-888-SLOSSON, FAX 800-655-3840
www.slosson.com/text/index.html

  Administration: 30-50 minutes. Individually-administered, the S-DMS combines the power of a diagnostic assessment with the quickness and convenience of a screener. S-DMS tasks include: 1) Math Concepts: numeration, geometry, measurement, time, money, fractions, percentages, decimals, and rounding; 2) Math Problem-Solving: one- and two-step application problems utilizing addition, subtraction, multiplication, and division operations—singularly and in combination; and 3) Math Computation: addi-tion, subtraction, multiplication, and division operations—advanced levels include decimals and fractions. Provides both grade and age norms yielding percentile ranks, performance ranges, and standard scores.

- ***Stanford Diagnostic Mathematics Test***—Fourth Edition 1.　　　　　　　　　5-13
(Beatty, Madden, Gardner, & Karlsen, 1995)
www.hbem.com/trophy/mathtest/sdmt4.htm
Harcourt Brace Educational Measurement (Psychological Corporation);
555 Academic Court, San Antonio, TX 78204-0952.

> This group-administered test is divided into six separate levels, identified by color; two forms are available for the upper three levels. Each level provides both multiple-choice and free-response formats to reveal the problem-solving process and product. In addition to yielding percentile ranks, stanines, grade equivalents, and scaled scores, the test results can be used to identify strengths and weaknesses in specific math skills.

- ***STAR Math***
Advantage Learning Systems, Inc., P.O. box 8036, Wisconsin Rapids, WI 54495-8036
800-890-1472
FAX 715-424-4242
www.advlearn.com

> Provides normative information (grade equivalents, percentile rankings, normal curve equivalents) for placement and monitoring of growth in achievement in 10-15 minutes of testing on a computer (Macintosh or Windows).

- ***Test of Early Mathematics Ability—2***　　　　　　　　　　　　　　　　PK-3
(Ginsburg & Baroody, 1990)
Pro-Ed, Inc., 8700 Shoal Creek Blvd, Austin, TX 78757, 512-451-3246, FAX 512-451-8542
www.proedinc.com/store/895.html

> This test of early math functioning takes about 5 to 10 minutes to administer and measures informal as well as formal (school-taught) concepts and skills. Items in informal mathematics focus on concepts of relative magnitude, counting skills, and calculation; items in formal mathematics focus on reading and writing numerals, number facts, calculational algorithms, and base-ten concepts. Results are reported as standard scores, percentiles, or age equivalents.

- ***Test of Mathematical Abilities—2***　　　　　　　　　　　　　　　　　3-12
(TOMA-2; Brown, Cronin, & McEntire, 1994)
Slosson Educational, Publications, Inc., PO Box 280, East Aurora, NY, 14052-0280, 1-888-SLOSSON, FAX 800-655-3840
www.slosson.com/text/index.html

> In addition to information about a student's skills in two major areas (story problems and computation), the test provides related information regarding expressed attitudes towards mathematics, understanding of mathematical vocabulary used in a mathematical sense, and the application of mathematical content in real life.

Adapted from *Teaching Students with Learning Problems,* 5th Edition; C.D. Mercer & A. R. Mercer; Prentice-Hall, Inc., 1998.

# II. Concrete—Representational—Abstract
(Manipulatives)

*"Skills are to mathematics what scales are to music or spelling is to writing.  The objective is to write, to play music, or to solve problems - not just master skills."*

—Everybody Counts

## Research
- The use of manipulative materials substantially increases the success of the learning process (Suydam, 1976).
- "The *Concrete-Representational-Abstract*  (CRA) sequence enables students to understand the concepts of math prior to memorizing facts, algorithms, and operations.  Instruction begins at the concrete level, where the student uses three-dimensional objects to solve computational problems.  After successfully solving problems at the concrete level, the student uses two-dimensional drawing (pictures of lines and tables) to solve computational problems.  After successfully solving problems at this level, the student begins work at the next level—the abstract level.  At the abstract level, the student looks at the computational problem and tries to solve it without using objects or drawings" (Mercer & Jordan, 1996).
- Teachers should model and teach students the use of different mnemonics to bridge mathematical developmental levels (Miller & Mercer, 1993).
- Teachers who use a variety of manipulative materials to enhance learning see an improvement in proficiency and understanding (Romberg, 1983).
- One reason remedial methods have not worked is that they focus on drill and not on the underlying cause of most students' difficulties—inadequate conceptual understanding (NCTM, 1993).
- Many students with learning problems experience difficulty in transforming word problems into mathematical representation (Hutchinson, 1993).
- Manipulatives build students' confidence by giving them a way to test and confirm their reasoning (Burns, 1996).
- Students need many repeated experiences and a variety of concrete materials to make these connections strong and stable (Garnett, 1996).
- The fact that concrete materials can be moved, held, physically grouped and separated makes them much more vivid teaching tools than pictorial representation (Garnett, 1996).

## Strategies
- Employ the use of the Concrete—Representational—Abstract (C-R-A) sequence to teach.
- Provide hands-on experiences/manipulatives to move the students' understanding from the concrete level to the representational level, especially at the elementary and middle school grades.
- See the list of recommended manipulatives for K-2, 3-5, 6-8, 9-12 in the Appendix.
- Use mnemonics to bridge the gap between concrete and representational levels.  An example would be SIGNS, which is used to solve word problems.  (S—*Survey*  question; I— *Identify*

key words and labels; G—*Graphically* draw problem; N—*Note* operation(s) needed; S—*Solve* and check problem.)

- Teach association techniques to enable students to remember key terms. Example: The numerator is the top number in a fraction; the denominator is the bottom number in a fraction. To remember the *numerator* and *top* go together, remember that they begin with letters *n* and *t* which are close to each other in the alphabet. Similarly, *denominator* and *down* begin with same letter, *d*.
- Teach students to visualize math symbols to assist in remembering meaning. For example: a cursive *m* stands for the *mean* of the population. Students can draw a bunch of *mean*-looking *m*'s to remember this symbol.
- Prior to instruction, determine the level of the student (concrete, representational, or abstract).
- Use manipulatives as a support for teaching math topics. Make them a regular part of general instruction.
- Help students understand and develop mental images of mathematical processes through the use of manipulatives.
- Select concrete and representational activities that have a direct correlation to the abstract concept.

# III. Learning Strategies

*"The best time to learn mathematics is when it is first taught; the best way to teach mathematics is to teach it well the first time."*
—Everybody Counts

## Research

- When students are taught with authentic tasks, learning is more relevant (Lock, 1996).
- Many students at-risk for failure require teacher support and direction in moving toward becoming self-regulated, life-long learners (Mercer & Jordan, 1996).
- A good starting point for mastery learning is to ensure that the learner understands math concepts and operations that are basic to the targeted skill (Mercer & Jordan, 1996).
- Learners must have sufficient prior knowledge to construct new and appropriate meaning (Mercer & Jordan, 1996).
- Reaching mastery on a skill improves retention, the ability to solve higher level problems, and the ability to complete homework faster (Mercer & Miller, 1992).
- Working in cooperative groups gives students the opportunity to talk about ideas, listen to others' ideas, and enables teachers to work more closely with students. Small group work can empower students to become more independent in their own learning (Better Mathematics Web Site).
- A variety of algorithm choices increases the chance of providing the student with a thinking model that best fits their learning style (NCTM, 1972).
- Multiple Intelligence Theory suggests that no single set of teaching strategies will work best for all students all the time. Use a variety of strategies to help all students become successful (Armstrong, 1994).
- The mastery of basic facts is a stepping stone to further achievement in mathematics (Pressly, 1986).

- Calculators are an essential technological device in our society. Schools need to provide instruction for the use of calculators (Dessart, DeRidder, and Ellington, 1999).
- Direct instruction is recommended for primary and at-risk students (Ellis & Fouts, 1997).
- High school students who received direct instruction in primary grades had lower school dropout rates, higher test scores, and a higher percentage of college applications and acceptances (Ellis & Fouts, 1997).
- To teach the relationships among concepts, the teacher can present the hierarchy of concepts to the learner (Driscoll & Tessmer, 1985; Kember, 1991; Markle, 1977).
- Use specific phases to solve unfamiliar problems: problem analysis, technical, and verification phases (DeCorte & Verschaffel, 1981).
- Higher expectations and effective interventions are essential ingredients of reform (Douglas & Carnine, 1991).

# Strategies
- Teach new concepts through authentic approaches.
- Use direct instruction, teacher modeling, and guided practice for at-risk students.
- Direct instruction can be carried out through guided discovery (with manipulatives or algorithms), class discussion, and cooperative activities.
- Assure understanding of concepts, then teach to mastery.
- Connect new learning with prior knowledge.
- Model, teach, and help students employ learning strategies (i.e. searching for patterns, using keywords and mnemonics, constructing a schema, verbalizing symbols, and analyzing/verifying).
- Incorporate visual cues; post them in the classroom for reference.
- Utilize cooperative learning groups and paired learning.
- Provide a variety of algorithms for teaching math topics including "traditional" and "non-traditional" methods.
- Design and implement curriculum that addresses all modalities: visual, kinesthetic, and auditory.
- Modify pace when needed.
- Provide alternative activities to encourage understanding of math concepts (rather than just computation).
- Frequently question students to ascertain their understanding of the mathematical concept being taught.
- Calculators should be used as a supplemental tool or resource within mathematical instruction.
- Use graphic organizers to teach the relationship among concepts.
- Model and teach mathematical processes: problem analysis (discover how to solve the problem), technical (carry out the problem), and verification (check the answer).
- Provide varied instruction (i.e. direct instruction, teacher centered, interactive instruction, computer assisted instruction) and high expectations to promote success in remediation.
- When remediating, integrate higher level thinking with the basic skills.

# IV. Communicating Math

*"Children do not learn by doing… They learn by thinking, discussing, and reflecting on what they have done."*

—Dr. William Speer

## Research

- Most students do not understand how to think mathematically (Pogrow, 1994).
- Students need to be able to convert language into mathematics and vice versa (Pogrow, 1994).
- Students and teachers need to have conversations to facilitate mathematical understanding (Pogrow, 1994).
- Students who use self-questioning techniques will become more independent learners (Cardelle-Elawar, 1995).
- Some learning disabled students are particularly hampered by the language aspects of math, resulting in confusion about terminology, difficulty following verbal explanations, and/or weak verbal skills for monitoring the steps of complex calculations (Lovitt & Curtiss, 1968).
- Students should learn not only to interpret the language of mathematics but also to use that language themselves (Van de Walle, 1994).

## Strategies

- Teach students to use self-questioning techniques.
- Encourage students to demonstrate an understanding of how problems are solved through written and verbal communication.
- Employ the use of math journals, extended response questions, story problems, etc.
- Slow down the pace of delivery of instruction and present information in chunks.
- Ask students to verbalize their thinking, weigh different options, and justify their answers as they manipulate the problem.
- Teach students to draw and/or write as a method to organize their thinking.
- Incorporate math vocabulary such as the FCAT vocabulary list in classroom instruction.
- Incorporate visual aids such as graphic organizers (charts and graphs) as ways of expressing mathematical ideas.
- Teach students to use and understand multiple problem presentations. For example, when adding and subtracting, teach students to write problems both vertically and horizontally.
- To see how writing works in communicating mathematics, see *Writing in Mathematics* by Joan Rhodes in the **Appendix**.

# V. Practice and Homework

*"Students simply do not retain for long what they learn by imitation from lectures, worksheets, or routine homework."*
— Everybody Counts

## Research

- The remedial student should be given split mathematical periods (time slots) in order to practice mathematical skill mastery (Lock, 1996).
- Instruction, review, and practice must be provided for longer time periods for students with mathematical deficiencies (Lock, 1996).
- "The desired result of practice is for the newly learned ideas and procedures to become automatic… short sessions, varied contexts and verbalizations of what is being done are important (Herman, 1993)."
- Mastery through practice is followed by maintenance of skills taught.  It is the maintenance activity that involves practice and review (Better Mathematics Web Site).
- Computer-assisted learning enhances self-esteem and makes students more proficient at math tasks (Mevarech, 1985).
- Homework becomes relevant and increases effectiveness when it includes practice on content just taught.  Homework has more value when it is corrected in class and discussed by the teacher (Better Mathematics Web Site).
- Use of flexible conceptual (different levels of understanding) approaches are more effective than the use of isolated and meaningless procedures (i.e. busy work) learned by rote (Van de Walle, 1994).

## Strategies

- Provide opportunity for students to develop proficiency with skills.
- Use independent practice.
- PRACTICE, PRACTICE, AND PRACTICE!!  (i.e. games, worksheets, cooperative learning, computer-assisted instruction, peer tutoring, etc.)
- Encourage regular parent involvement.
- Provide homework that is meaningful to students' needs.
- The use of computer-assisted learning provides alternative, effective practice that is tailored to individual student needs, yields immediate feedback, and gives accurate correction of problems.
- Keep practice sessions short.
- Reinforce students for effort on math homework and stress that errors are learning opportunities.
- Individualize practice so that students practice what they need.
- Provide conceptual practice prior to assigning homework.
- Help students understand the purpose of practicing.
- The purpose of homework is to provide practice, explore problem-solving strategies, and allow students to learn from their mistakes.
- Give students the answers to the homework when assigned.
- Provide homework to students in grades 1-12 to provide opportunity for practice.

# VI. Equity / Success for All

*"We cannot have a just or peaceful society if major segments of it see little hope for their children."*

— Robert E. Slavin

## Research

- All students benefit from small class size. Non-white students benefit more than white students. Economically disadvantaged students also benefit more (Robinson, 1990; Project Challenge, 1989-97).
- Equity aims directly at what students do know rather than establishing a narrow hurdle that too often screens students from further mathematics or suggests only that they have not achieved (MSEB, 1993).
- Intentionally working to recruit diverse members of the student body to participate in extracurricular events is worthwhile (Cisneros & Billings, 1994).
- Presenting mathematical concepts in a way that is not meaningful or relevant to students may limit their ability to connect existing knowledge to the problem being presented (Campbell & Langrell, 1993).
- Research shows that a more equitable situation can be created by providing health and nutrition programs, daycare, parent literacy training, parental involvement, community involvement and provide a safe and secure learning environment (NAEYC, 1997; Schweinhart, Barnes, & Weikart, 1993).
- Students' feelings about themselves as learners and about their experiences with mathematics can greatly influence the level of their efforts and eventual success (Bley & Thornton, 1995).
- Research shows that the use of calculators allows students to focus on problem-solving rather than becoming bogged down with computations (Fleischner et al, 1987).

## Strategies

- Celebrate each student's thinking, whether that thinking is a solution process, recognition of a relationship, or simply a statement of fact about the problem.
- Consider students' background and knowledge when determining assessment tools.
- Devise tasks with sufficient flexibility to give students a sense of accomplishment to challenge the upper reaches of students' mathematical understanding.
- Create opportunities for young people to have positive interactions across ethnic, gender, socioeconomic, and racial lines. Sports teams are a good example and we should look to create more opportunities in school.
- To prevent the development of learned helplessness in children, provide children with successful learning, teach frustration toleration, give feedback on both correct and incorrect work, and encourage persistence and the use of problem-solving strategies.
- Provide an environment that is accepting, encouraging, stimulating, and enjoyable.
- Help students understand the premise that their own efforts influence both success and failure.
- Use calculators to improve students' attitudes toward mathematics.
- Use diverse and positive role models/mentors to enable students to understand what future opportunities await them.

# Instructional Resources

## Mathematics Programs

*Accelerated Math*

Accelerated Math is a student-friendly program that allows teachers and students to create activity sheets. The program monitors student and/or class achievement based on predetermined or imported objectives. Accelerated Math allows teachers to chart students' growth and create worksheets to help students work on certain skill areas. After finishing the skill sheets, they can be scanned into the computer and assessed.

**Grade Levels:** 3-12
**Contact:**　　　　Advantage Learning Systems
　　　　　　　　　1-800-338-4204
　　　　　　　　　www.advlearn.com   e-mail: answers@advlearn.com

*Activities Integrating Mathematics and Science (A.I.M.S.)*

AIMS is an instructional program that considers the state of readiness of all students to engage in hands-on integrated math/science activities. AIMS encourages students to actively participate in interesting real-world situations that make mathematics meaningful and better understood.

**Grade Levels:** K-9
**Contact:**　　　　AIMS Education Foundation,
　　　　　　　　　P.O. Box 8120,
　　　　　　　　　Fresno, CA 93747-8120
　　　　　　　　　www.aimsedu.org

*Computer Curriculum Corporation (CCC)*

The CCC Success Maker Software Program offers a wide variety of courses K-Adult in both Macintosh and Windows versions. The programs are interactive. They include diagnostic and management systems. These tools produce custom reports which enable teachers to diagnose student needs and progress to set up individualized programs.

There are seven math courses offered: Math Concepts & Skills  (K-8), Problem Solving  (3-6), Math Investigations  (5-8), Math Enrichment  (7-9), Introduction to Logic  (7-12), Algebraic Topics  (8-12)

Math Concepts and Skills, a course common to elementary, middle, and high school levels, develops and maintains students' essential mathematics foundations. It covers the strategies, concepts, and skills needed for continuous progress and understanding in math. The course provides guided instruction, a help prompt, and automatic adjustment of the difficulty level. Each student receives instruction tailored exactly for his or her needs.

**Grade Levels:** K-12
**Contact:**　　　　Jorge Ortega
　　　　　　　　　Email: ortegaj@mail.leon.k12.fl.us

## Connected Mathematics (CMP)

The Connected Mathematics Project is a complete middle school mathematics curriculum. CMP materials can also be used in conjunction with other materials. The units are based on six content goals: number, geometry, measurement, algebra, statistics, and probability. Each grade consists of eight units with each unit developing a major concept.

CMP is a problem-centered curriculum. The units address mathematical ideas through a series of investigations. Each investigation contains problems for teachers and students to explore. As students explore connected problems, they develop understandings of mathematical concepts. Lappen, Glenda, Dale Seymour Publications (1998)

**Grade Levels:**  6-8
**Local Contact**:  Kris Ellington (Leon County Schools) or
                    www.mth.msu.edu/cmp

## Connecting Math Concepts (SRA)

Connecting Math Concepts (SRA) is a direct teaching math program. New concepts are presented in small incremental steps, interconnected with several math strands, and extended into subsequent lessons until mastery is achieved. Connecting Math Concepts is designed to 1) organize lessons around a number of topics rather than a single topic, 2) make connections between important concepts, 3) maximize instructional time, 4) introduce concepts at a reasonable rate, and 5) provide guided and independent practice.

The program consists of a teacher's guide and a presentation manual and student workbooks. Manipulatives are not included.

**Grade Levels:**  1-6
**Contact:**        SRA
                    Southwestern Region
                    8936 Western Way, Suite 5
                    Jacksonville, FL 32256
                    1-800-457-4299
                    www.sra-4kids.com

## Corrective Mathematics (SRA)

Corrective Mathematics is a series of seven modules designed to teach basic math skills: addition, subtraction, multiplication, division, fractions, decimals, percents, ratio, and equations. The series may be used for remedial work or as a part of a developmental sequence.

**Grade Levels:**  PreK-adult
**Contact:**        Siegfried Engelmann and Doug Carmine
                    Macmillan/McGraw-Hill
                    220 East Danieldale Rd.
                    Desota, TX 75115-2490
                    1-888-SRA-4KIDS
                    www.sra-4kids.com

### Family Math

The Family Math program includes 6-8 sessions of an hour or two. It provides parents opportunities to teach and develop problem solving skills and an understanding of mathematics through the use of "hands on" materials with children.

**Grade Levels:**   K-8
**Contact:**          Lawrence Hall of Science
                     University of California
                     Berkeley, CA   94720
                     Attn: FAMILY MATH
                     510-642-1823

### Hands On Equations

The Hands On Equations learning system is a manipulative, sequential math program focused on beginning skills in Algebra. Hands On Equations uses manipulative pawns and cubes to take students through beginning algebra concepts. The equality of two sides of an equation is represented by a balance scale. "Balance" is maintained by keeping the sides of the scale equal in value.

The complete system has 26 lessons. Step by step instructions and practice worksheets are provided for each lesson. The program may be used as a whole class activity or in small groups.

**Grade Levels:**   4-9
**Contact:**          Borenson and Associates 1-800-993-6284
**Local Contact:**  Brita Darling at Springwood Elementary 850-488-6225

### HSCT Simulation (Skills Assessment Software)

The High School Competency Simulation is an interactive, user friendly, comprehensive, computer based training and testing software program designed to help students prepare and pass the Florida HSCT. The HSCT study guide is a collection of topics to familiarize students with the rules and regulations of the Florida HSCT and learn how to use the software to prepare for the test. The simulation has 600 different questions divided into 21 basic mathematics and communication skills.

Available through the Florida School Book Depository  904-781-7191

**Grade Levels:**   11-12
**Contact:**          Chris Wende
                     North Florida Sales Representative
                     904-241-0430  Jacksonville

### Jostens

Jostens helps students fully develop and acquire the fundamental concepts and strategies they need to reach their full potential as mathematical problem solvers. Designed to fully engage students, this comprehensive curriculum provides approximately 1000 multi-sensory activities that make learning math a multimedia adventure. Students learn through discovery, and by developing their reasoning skills, making connections across the curriculum and using mathematical concepts to help them communicate. The instruction is relevant to students' everyday lives and is designed to address the standards recommended by the NCTM.

**Grade Levels:**   K-8

**Contact:**     Tomorrow's Promise Mathematics Software Jostens Learning
         Email: www.jls.com
**Local Contact:**  Jorge Ortega
         Email: ortegaj@mail.leon.k12.fl.us

### *Mathematics Experienced-Based Approach (MEBA)*

Math Experienced-Based Approach (MEBA) is an instructional program designed to help students develop an understanding and memory of mathematics that lasts a lifetime. This developmental approach fosters mathematical understanding by building deliberate connections among physical models, pictures, and symbols with associated concepts and procedures. Students learn how to integrate problem solving with spatial visualization, cooperative learning, and the use of oral and written language to communicate mathematical concepts and relations. MEBA is an active learning program focusing on number sense, relations, problem solving, computation from concrete to abstract, and mathematical communication. It closely aligns with NCTM recommendations.

**Grade Levels:**  K-8
**Contact:**     Mary Gilfeather and John del Regato
         Pentathalon Institute
         P.O. Box 20590, Indianapolis, IN 46220
         317-782-1553
**Local contact:**  Joan Rhodes, Springwood Elementary, Leon County Schools
         850-488-6225

### *Mathematics Their Way*

Mathematics Their Way provides teachers with activities that develop understanding and insight of the patterns of mathematics through the use of concrete materials. The activities are designed to help young children see relationships and interconnections in mathematics and to enable them to deal flexibly with mathematical ideas and concepts.

**Grade Levels:**  PreK-2
**Contact:**     1100 Ashwood Parkway, Suite 145
         Atlanta, GA 30338
         800-241-3532

### *Mr. Goodmath*

The Mister Goodmath program consists of a curriculum that helps make the teachers and students become more comfortable with math. The program requires a teacher to assume the role of "Mister Goodmath," a colorful character, who introduces students to a new strategy or idea and challenges them to a problem of the week. This is done via the school's closed circuit TV system in live or pre-taped segments and/or the internet. Mr. Goodmath has an active web site at http://www.safari.net/~rooneym.

**Grade Levels:**  K-8
**Contact:**     Welleby Elementary School
         3230 Nob Hill Road
         Sunrise, FL 33335
         Attn: Mr. Mike Rooney
         954-572-1210
         Email: *rooneym@safari.net* or *rooneym @mail.firn edu*

***Parallel Alternative Strategies for Students (PASS)***
Parallel Alternative Strategies for Students (PASS) books are content-centered, supplemental materials designed to help secondary teachers meet the needs of students at a variety of achievement levels. The math material offered is divided into three areas: *Building General Mathematics Skills, High School Competency Test,* and *Consumer Mathematics.* These materials are competency based. Teacher guides are available.

**Grade Levels:** 9-12
**Contact:**      Carolyn Smith
           Department of Education
           Product Distribution Room 644
           325 West Gaines Street
           Tallahassee, FL 32399-0400

***Precision Teaching***
The Precision Teaching Curriculum comprises a set of measurement and practice procedures designed to facilitate instructional decisions while at the same time developing strong basic skills. One-minute repeated practice sessions build tool skills as well as basic skills. Five steps guide the process: (1) pinpoint a specific academic behavior (2) select a specific practice sheet that correlates with the current curriculum (3) score and chart the number of correct and incorrect responses (4) make data-based curricular decisions and (5) develop management plans for both individual and group programs.

**Grade Levels:** 6-8
**Contact:**      FDLRS 850-487-2630

***Skills Bank/Cornerstone***
Skills Bank/Cornerstone is a comprehensive basic skills program. It addresses goals set by national curriculum guidelines. The program covers the full scope of concepts found in major text books. It provides skill practice in number concepts, whole numbers, decimals, fractions, percents, data analysis, and graphs. Diagnostic pre and post tests are also provided.

Prescriptive pretests let the teacher assign specific lessons where they are needed. A five step lesson designs assesses, and reinforces skills to ensure mastery. This feedback customizes the lessons to individual student performance. Separate lessons for grades 3-4, 5-6, 7-8 provide appropriate skills, themes, and reading levels. Lessons follow the 5 step approach: warm up (watch the steps performed by the computer), review (practice), quiz, take five (repeated practice using a game format), and worksheet.

**Grade Levels:** 3-8
**Contact:**      Learning Company School Division
           7104 Ambassador Road
           Baltimore, MD 21244
           800-84-SKILL
           www.learningcompanyschool.com   e-mail: sales@skillsbank.com

*STAR Math*

STAR Math is a diagnostic computer software program which uses individual tests to identify a students' grade equivalent, percentile rank and/or NCE scores. STAR Math generates reports, which can be shared with parents.

The program is tailored to individual students. As students answer correctly, the items increase in difficulty. If the answer is incorrect, the program will ask easier questions. This 15-minute test can be administered throughout the year to chart progress; no two tests are exactly the same. The result can be given in a scaled score, grade level equivalent, percentile rank, or NCE score. Reports can also be generated to share with the parents.

**Grade Levels:**   K-12
**Contact:**           Advantage Learning Systems
                          1-800-338-4204
                          www.advlearn.com   e-mail: answers@advlearn.com

*Strategic Math Series*

The Strategic Math Series, sometimes called "Pig Math," is a systematic, sequential math series directly aimed at student fluency of basic math facts. There are two levels of Strategic Math. Level I is for remedial students who are having difficulty mastering basic facts. Level II is for students who have knowledge of basic facts and are ready to acquire more complex computational skills. Both levels operate under the premise that math skills/facts need to be presented concretely, then representationally, and finally reviewed in the abstract (C-R-A method) for mastery.

Within each manual the lessons are broken into phases. Phase 1 is the pretest. If the student scores below 80%, that student then continues with all of the remaining lessons. If the student scores above 80%, that student then goes to another book with higher level basic facts. Phase 2 of each manual explores basic facts with concrete manipulative. Phase 3 of each book addresses the representational application of basic facts. Students are expected to "illustrate" a problem. Phase 4 is an introduction to the "Draw" strategy. Phase 5 is when abstract application is used. Phase 6 is the final posttest. There is a Phase 7 if mastery is not achieved on the posttest.

**Grade Levels:**   1-12
**Contact:**           Cecil Mercer and Susan Miller
                          University of Florida
                          352-392-5874
**Local Contact:**  FDLRS 850-487-2630

*Sunshine Math*

The purpose of Sunshine Math (K-8) is to provide additional challenges for self-motivated students in a structured, long-term program that does not impinge on the normal classroom routine or the time of the teachers. It is a supplemental program to provide challenges and re-ward. Participation is meant to be optional. Sunshine Math incorporates  wide range of skills through problem solving and logical thinking tasks.

**Grade Levels:**   K-8
**Contact:**           Brenda Olschlager
                          Buck Lake School, Leon County Schools
                          Tallahassee, FL
                          850-488-6133

# Videos

*Creating a Climate for Change . . . Math Leads the Way*   A 53 minute video for use as a series of professional development workshops for pre-service and in-service math teachers.  Can also be used for presentations to parents, community and business leaders, school boards and policy makers.  Developed by The Math Connection, and published by The Annenberg/CPB Math and Science Collection.

*"Good Morning Miss Toliver,"*   National Science Foundation.  This 30 minute video shows how Kay Toliver combines math and communication arts skills to inspire and motivate her students.

*Mathematics:  Making the Connection,* National Council of Teachers of Mathematics.  A short videotape (12.5 minutes) demonstrating how mathematics connects to the lives and professions of well-known individuals such as jazz musician Wynton Marsalis, and architect Peter Eisenman.  Useful for presentations.

*Mathematics:  Assessing Understanding,* Cuisenaire Co. of America, Inc.  This video shows Marilyn Burns conducting individual interviews with students.  The tapes provide teachers with models of appropriate questions for gaining insights into students' understanding.  Marilyn also models the kind of interaction between teacher and student that is basic to assessing their mathematical thinking.

*Mathematics for Every Child,* National Council of Teachers of Mathematics.  This video (8 minutes) "highlights the positive changes taking place in math classrooms and the leadership role NCTM plays in effecting these changes."

*Teacher Talk: The Math Trail,* Foundation for Advancement in Science and Education.  This tape is one in a series of tapes that combines interviews with an effective math teacher, Kay Toliver, and their real students with unrehearsed footage of classroom interaction.  The Math Trail uses concepts from math curriculum to create books of problems based on objects and events in Ms. Toliver's classroom.

*Teacher Talk: Mathematics and Communication,* Foundation for Advancement in Science and Education.  This tape is one in a series of tapes that combines interviews with an effective math teacher, Kay Toliver, and their real students with unrehearsed footage of classroom interaction.  This video discusses and demonstrates the uses of speaking and writing as tools to develop—and assess—student understanding of math concepts.

*Teacher Talk: Oobleck,* Foundation for Advancement in Science and Education.  This tape is one in a series of tapes that combines interviews with an effective math teacher, Kay Toliver, and their real students with unrehearsed footage of classroom interaction.  This tape uses the Dr. Seuss book in a lesson that combines literature, scientific method, and imagination.

# Software

**Title:** **Access to Math**
**Company/Phone:** Don Johnston, Inc.
**Format/Platform:** Mac
**Grade Levels:** K-6
**Description:** This talking math program allows students to work problems on-screen with learning support in the four basic operations and teachers to create on-screen worksheets. Program shows number borrowing and carrying as it would on paper. It includes Discover files for easy scanning access for students who do not use the mouse.

**Title:** **Algebra Animator**
**Company/Phone:** Logal
**Format/Platform:** CD-ROM; Mac/Windows
**Grade Levels:** 7-12
**Description:** Students visualize, model, and manipulate the behavior of objects, using functions whose variables represent distance, height, width, and time. The program features built-in modeling tools and five views-animation, algebraic expression, graph, range-domain diagram, and a basic spreadsheet.

**Title:** **Astro Algebra**
**Company/Phone:** EdMark Corporation, 800-691-2986
**Format/Platform:** Windows/Mac
**Grade Levels:** 6-12
**Description:** Student acts as an interstellar traveler. The program creates a unique Grow Slide record for each user allowing the user to proceed to the next mission with a built in calculator and a user's guide. Students can practice the following skills: graphing coordinate pairs; linear equations; inequalities on the coordinate plane; identifying the slope and intercepts of line graph; identifying the solution of systems of equations; graphing a relationship from a table; modeling inequalities on the number line; translating fractions to decimals; evaluating numeric and algebraic expressions; and writing word sentences as algebraic expressions.

**Title:** **James Discovers Math**
**Company/Phone:** Borderbund
**Format/Platform:** CD-Rom; Mac/ Windows
**Grade Levels:** Pre-K-2
**Description:** Students can choose from a variety of age-appropriate activities that progress through multiple levels of difficulty. Each module introduces early math concepts and specific skills including addition, subtraction, counting, sorting, classifying, estimation, measurement, number recognition, patterning, problem solving, shape recognition, spatial visualization, and telling time. A teachers guide and blackline masters are included.

**Title:** **KidsMath**
**Company/Phone:** Great Wave Software
**Format/Platform:** Mac/Windows

| | |
|---|---|
| Grade Levels: | PreK-3 |
| Description: | KidsMath has eight individual games.  Each teaches a variety of skills which may include beginning mouse skills, eye-hand coordination, counting, addition, subtraction, multiplication, division, measuring, fractions, place value, and problem solving.  This software provides directional cues and both auditory and visual error-correction feedback. |
| Title: | **Math for the Real World** |
| Company/Phone: | Davidson |
| Format/Platform: | CD-ROM; Mac/Windows/MS-DOS |
| Grade Levels: | 1-5 |
| Description: | Students solve a variety of real-life problems involving time, money, fractions, logic, charts and more as they travel the country with an up-and-coming rock band and earn money to make a music video.  Students can use an onscreen calculator or access a reference section which explains the problem if they need help. |
| Title: | **Math Workshop** |
| Company/Phone: | Broderbund |
| Format/Platform: | CD-Rom; Mac/ Windows/MsDos |
| Grade Levels: | K-6 |
| Description: | This program leads students through several different activities that cover problem solving, basic operations, computation, fractions, pattern recognition, estimation, spatial thinking and logical reasoning.  Each activity includes multiple levels and includes a teacher guide and activity sheets. |
| Title: | **Math Workshop Deluxe** |
| Company/Phone: | The Learning Company |
| Format/Platform: | CD-ROM; Mac/Windows |
| Grade Levels: | K-4 |
| Description: | Program includes engaging activities that cover math skills in computation, estimation, fractions, decimals, percents, logical reasoning, spatial visualizations, scale and symmetry.  Each activity includes multiple levels. |
| Title: | **Stickybear's Math Town** |
| Company/Phone: | Optimum Resources, Inc. |
| Format/Platform: | Mac/Windows |
| Grade Levels: | K-5 |
| Description: | This program has six locations to choose from to practice basic skills including: addition, subtraction, multiplication, division, and word problems.  Program adjusts to meet individual levels of students.  Records up to 40 students can be recorded at one time.  Generates reports on student performance. |
| Title: | **StudyWorks Mathematics I** |
| Company/Phone: | MathSoft, Inc. |
| Format/Platform: | CD-ROM; Mac |
| Grade Levels: | 9-12+ |
| Description: | StudyWorks provides a rich computer environment for students to write |

equations, perform calculations, addtext, complete and check solutions to math problems, printout "great-looking" homework papers and reports. The reference materials include standard formulas, essential statistics, helpful descriptions, sample problems for algebra, geometry, precalculus, calculus and statistics.

| | |
|---|---|
| Title: | **StudyWorks Mathematics II** |
| Company/Phone: | MathSoft, Inc. |
| Format/Platform: | CD-ROM; Windows |
| Grade Levels: | 9-12+ |
| Description: | StudyWorks provides a rich computer environment for students to write equations, perform calculations, add text, complete and check solutions to math problems, print out "great-looking" homework papers and reports. The reference material includes standard formulas, essential statistics, helpful descriptions, sample problems for algebra, geometry, precalculus, calculus and statistics. |

| | |
|---|---|
| Title: | **Trudy's Time & Place House** |
| Company/Phone: | EdMark Corporation, 800-691-2986 |
| Format/Platform: | CD-Rom; Mac/Win |
| Grade Levels: | Pre K -2 |
| Description: | Students learn to tell time on the whole, half and quarter hour with Analog Ann and Digital Dan.  They learn about seasons, morning, noon, and night as they work with the calendar clock.  They work with map symbols in the sandbox map as they build cities, roads, bridges, tunnels.   They explore the relationship among the earth, globe, and world map. |

| | |
|---|---|
| Title: | **Unifix Software** |
| Company/Phone: | Didax, Inc. |
| Format/Platform: | Mac |
| Grade Levels: | K-4 |
| Description: | Unifix Software links the use of manipulatives with computers.  It is an open-ended, activity-based software that can be modified for different abilities, ages, and interests.  The program comes with manipulatives, a teacher's manual, and activity sheets. |

# Selected Software for Algebra

*The following is a list of software for pre-algebra and algebra students:*

Title: **Algebra Smart**
Contacts: Princeton Review Publishing
50 Mall Road, Suite 210
Burlington, MA  01803
800-2-REVIEW

Pros:
—practice skills
—entertaining for high school students
—games and unlimited question center
—correlation to several math textbooks
—quizzes, tests, final exam
—status portfolio maintained

Cons:
—traditional math content
—multimedia causes software hang-ups
—some explanations are vague
(needs supplemental activities &
explanations)

Title: **Math Probe**
Contacts: Math Resources
5516 Spring Garden Rd., Suite 203
Halifax, Nova Scotia, Canada B3J166
902-429-1323; Fax:  902-492-7101
http://www.mathresources.com

Pros:
—math dictionary
—clear explanations
—easy graphing
—simulations

Cons:
—limited examples
—not enough practice

Title: **Edustar Applied Mathematics**
Contacts: Edustar America, Inc.
59 Herndon Pkwy. Suite100
Herndon, VA 20170
703-708-9250; 800-237-3838;  Fax:  703-708-9255
http://www.edustaramerica.com

Pros:
—selection of word problems
—tutor, step-by-step hints
—nice graphics
—real world problems

Cons:
—difficult to use initially
(unclear how to use tools)
—limited math concepts

Title: **Logal Algebra Animator**
Contacts: Logal Software, Inc.
125 Cambridge Park Drive
Cambridge, MA 02140
800-564-2587; 617-494-4440; Fax:  617-491-5855
http://www.logal.com

Pros:
—simulations for linear and quadratic
—graphing
—create your own simulations and lessons
—lessons stored in a student portfolio
—webable

Cons:
—limited math concepts
—difficult to use simulation pallet

Title          **Interactive Algeblocks**
Contacts:      South-Western Educational Publishing
               5101 Madison Road, Cincinnati, OH 45227
               800-543-0487; http://www.swpco.com

Pros:
—visualizes concepts of polynomials
   (operations on polynomials)
—easy to use

Cons:
—graphics are visually unappealing
—limited math concepts
—traditional mathematics

Title:         **MathSoft Study Works**
Contacts:      MathSoft, Inc.
               01 Main Street
               Cambridge, MA 02142
               http://www.mathsoft.com

Pros:
—graphing calculator capabilities
—practice and problems to solve
—many tools and options
—invites writing in mathematics
—webable

Cons:
—difficult to use
—only one real-world problem
   to each problem set

Title:         **Math-at-Work**
Contacts:      CORD Communications
               PO Box 21206
               Waco, TX 76702-1206
               817-776-1822; 800-231-3015

Pros:
—problem solving situations
—entertaining and realistic

Cons:
—limited math concepts
—confusing to use

Title:         **Logal Function Investigator**
Contacts:      Logal Software, Inc.
               125 Cambridge Park Drive
               Cambridge, MA 02140
               800-564-2587; 617-494-4440; Fax:  617-491-5855
               http://www.logal.com

Pros:
—wonderful higher level math
   simulations
—webable
—great lessons

Cons:
—difficult and confusing to use initially

Title:          **The Learning Equation**
Contacts:       ITP Nelson

Pros:                                           Cons:
—covers all of algebra                          —traditional mathematics explanations and
—shows applications in real life                    examples
                                                —limited math concepts

Title:          **Scientific Notebook**
Contacts:       TCI Software Research, Inc.
                Broos/Cole Publishing Company
                511 Forest Lodge Rd.
                Pacific Grove, CA 93950
                800-423-0563; http://scinotebook.tcisoft.com

Title:          **Mathpert**
Contacts:       Mathpert Systems
                2221 Lawson Lane
                Santa Clara, CA 95054
                800-361-1001
                http://www.mathpert.com

Pros:                                           Cons:
—powerful to enter your own problems            —wording of steps are unclear
  to solve                                      —buggy
—practice exercise to do homework              —many unanswered questions
—autostep to do homework problems                  on what to highlight in order to solve
—large selection of practice  problems  and
  categories (Algebra to Calculus)
—graphing capability

Title:          **Algebra Explorations**
Contacts:       Holt, Rinehart, and Winston

Title:          **MRI Graphing Calculator**
Contacts:       Edustar America, Inc.
                59 Herndon Pkwy. Suite100, Herndon, VA 20170
                703-708-9250; 800-237-3838;  Fax:  703-708-9255
                http://www.edustaramerica.com

Pros:                                           Cons:
—all the functions of a TI 83+ graphing         —just a tool without problems and
  calculator                                        application (can get problems from actual
- easy to use and eliminates the need for           graphing calculator books)
- actual calculators and batteries

Title:          **Interactive Math Dictionary**
Contacts:       Edustar America, Inc.
                59 Herndon Pkwy. Suite100
                Herndon, VA 20170
                703-708-9250; 800-237-3838; Fax:  703-708-9255
                http://www.edustaramerica.com

Pros:                                          Cons:
—higher level Math Probe software              —limited to upper mathematics
   primarily for Calculus and above
—easy to operate

Title:            **Prentice Hall Multimedia Algebra**
Contacts:         Prentice-Hall
                  1 Lake Street
                  Upper Saddle River, NJ 07458
                  800-848-9500

Title:            **Boxer Algebra Boxer Trig**
Contacts:         Boxer Learning, Inc.
                  300 E Market Street
                  Charlottesville, VA 22902
                  800-736-2824; Fax:  804-977-6484
                  http://www.boxer.com

Pros:                                          Cons:
—easy to understand                            —traditional mathematics
   lessons and practice for Algebra and        —hyperstack of questions
—Trigonometry                                  —not very engaging

Title             **Geometer's Sketchpad**
Contacts:         The Geometer's Sketchpad
                  Key Curriculum Press
                  800-995-MATH

Pros:                                          Cons:
—creative and interactive                      — difficult to use initially
—supplemental materials for discovery-
   based lessons

Title:            **Prentice Hall Advanced Algebra**
Contacts:         Prentice-Hall
                  1 Lake Street
                  Upper Saddle River, NJ 07458
                  800-848-9500

# Books

Burns, M. (1976). *The Book of Think (Or How to Solve a Problem Twice Your Size)*. Boston: Little, Brown & Company.

Burns, M. (1975). *The I Hate Mathematics! Book*. Boston: Little, Brown, & Company.

Burns, M. (1982). *Math for smarty pants*. New York: Scholastic.

Chuska, K. R. (1995). *Improving classroom questions*. Bloomington, IN: Phi Kappa Delta Educational Foundation.

Coates, G. D. & Stenmark, J. K. (1997). *Family Math for Young Children*. Berkeley, CA: University of California Press.

Florida Mathematics Curriculum Framework. (1996). State of Florida, Department of State.

Jensen, E. (1998). *Teaching with the Brain in mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Karush, W. (1989). *Webster's New World Dictionary of mathematics*. New York: Prentice Hall Press.

Kenda, M. & Williams, P. S. (1995). *Math Wizardry for Kids*. Hauppage, NY: Barron's.

Marzano, R. J., Brandt, R. S., Hughes, C. S., Jones, B. F., Presseisen, B. Z., Rankin, S. C., & Suhor, C. (1988). *Dimensions of learning: A framework for curriculum and instruction*. Alexandria, VA: Association for Supervision and Curriculum Development.

Mathematics Teacher Resource Handbook: A Practical Guide for Teaching K-12 Mathematics. (1993). Thousand Oaks, CA: Corwin Press.

Meece, J., & McColskey, W. (1997). *Improving Student Motivation*. SERVE.

Mokros, J., Russell, S., & Economopoulos, K. (1995). *Beyond arithmetic: Changing mathematics in the elementary classroom*. Palo Alto, CA: Dale Seymour.

Stein, M., Silbert, J., & Carnine, D. (1997). *Designing effective mathematics instruction: A direct instruction approach*. Upper Saddle River, NJ: Merrill.

Stenmark, J.K., Thompson, V., & Cossey, R. (1986). *Family Math*. Berkeley, CA: University of California Press.

Tuley, K., & Bell, N. (1997). *On Cloud Nine: Visualing and Verbalizing for Math*. San Luis Obispo, CA: Gander.

Van de Walle, J. A. (1998). *Elementary and Middle School Mathematics: Teaching Developmentally*. New York: Longman.

# Appendix

# I. Programs/Methods/Strategies & Assessment Tools Grids

Assessment and monitoring student progress is an on-going process and integral part of all teachers' work. Just as the nature and scope of students' learning varies, different forms of assessment are needed as students learn, and teachers plan their work accordingly. This section of "Whatever It Takes" includes some of the programs, methods, and strategies, as well as assessment measures, used in the schools.

The information provided for your use has been compiled from the reading surveys turned in during the 1998–99 school year and from some phone surveys during the summer of 1999. Please feel free to contact any of the schools to gain further information pertaining to the implementation of the assessment measures, programs, methods, and strategies.

# II. Yopp-Singer Test of Phoneme Segmentation

Student's name _____   Date _____

Score (number correct) _____

**Directions:** Today we're going to play a word game. I"m going to say a word and I want you to break the word apart. You are going to tell me each sound in the word in order. For example, if I say *old*, you should say "/o/-/l/-/d/." (Administrator: Be sure to say the sounds, not the letters, in the word.) Let's try a few together.

**Practice items:** (Assist the child in segmenting these items as necessary.) ride go man

**Test items:** (Circle those items that the student correctly segments; incorrect responses may be recorded on the blank line following the item.)

1. dog _____
2. keep _____
3. fine _____
4. no _____
5. she _____
6. wave _____
7. grew _____
8. that _____
9. red _____
10. me _____
11. sat _____

12. lay _____
13. race _____
14. zoo _____
15. three _____
16. job _____
17. in _____
18. ice _____
19. at _____
20. top _____
21. by _____
22. do _____

From "A test for Assessing Phonemic Awareness in Young Children," by H.K. Yopp, 1995, *The Reading Teacher, 49*, 20–29.

# III. Phonic Generalization for 1st Grade

from *Beginning to Read,* by Marilyn Adams

The following phonic rules were found to be useful at least 90% of the time for pronunciation (Clymer, 1963).,

1. Vowels Digraphs: For example, *oa*: the first vowel is long and the second one is silent.

2. Double E: *ee* words have the long e sound. (FYI: % other vowel digraphs followed this rule – *ai – 64%; ea – 66%; ui – 6%)*

3. *are* in words: when *ar* is followed by *final e*, the sound is like that in *care*.

4. Double consonants: as in *carry*, only one consonant is heard.

5. Sounds for *c:* when letter *c* is followed by *o* or *a*, or a consonant, *c* has the /*k*/ sound. when letter *c* is followed by *i, e,* or *y*, *c* has the *s* sound.

6. *ch* sound: /ch/ makes only one sound, like in chair.

7. *ck* sound: when a word ends in *ck* it sounds like /k/.

8. Silent *k*: when a word begins with *kn*, the *k* is silent.,

9. Silent *w:* when a word begins with wr, the *w* is silent.

10. Silent *gh*: when a word has ght in it, the *gh* is silent.

## ONSETS AND RIMES

It's often easier for children to hear, the beginning letter(s), **onset,** of a word and the other part of the word beginning with the vowel attached, called the rime. In the word "train", the onset is *tr* and the rime is *-ain*. It can be more productive to teach vowel sounds by using "rhyming phonograms" than by isolated vowel sounds. The following 37 rimes can be used to make about 500 primary words. (Wiley & Durrell, 1970)

| -ack | -ail | -ain | -aker | -ale | -ame | -an |
| -ank | ap | -ash | -at | -ate | -aw | -ay |
| -eat | -ell | -est | -ice | -ick | -ide | -ight |
| -ill | -in | -ine | -ing | -ink | -ip | -ir |
| -ock | -oke | -op | -ore | -or | -uck | -ug |
| -ump | -unk | | | | | |

# IV. Writing in Mathematics
Compiled by Joan Rhodes, Elementary Math Resource Teacher

**Writing:**
- Requires you to express your own ideas and use your own words
- Requires gathering, organizing, and clarifying thoughts
- Demands finding out what you know and what you don't know
- Calls for thinking clearly
- Requires making sense of an idea and presenting it clearly
- It is very powerful and deliberate reflective thinking
- Can include pictures, graphs, and symbols

**When writing:**
- Must stop first and think
- Incorporates drawings and symbolism to help convey their ideas
- Collects ideas and explains them
- Provides a unique window to students' thoughts
- Reflects uniquely the way a student is thinking about an idea
- Expresses conceptual understandings and problem solving
- Includes descriptions of ideas, solutions, and justifications of problems
- Expresses questions concerning the topic (something they need help with or don't quite understand)
- Expresses feelings about math

**Teachers Use writing:**
- To reflect on each individual
- To target feedback and design special work for individual students
- To assess teacher's progress of a unit
- To communicate with parents during a conference

**Writing Feedback:**
- Students need to feel free to tell teachers what they know so teachers avoid grading writing in the sense of grading a test
- Teachers should point out serious errors that need attention
- Teachers should comment on interesting ideas
- Teachers should ask for further clarification
- If time permits, teachers should talk with students about their writing (most effective)
- By not responding, teachers  tells students that they don't value what their students have written
- Writing should never be busy work

# Types of Writing:

**Journal**
- Most often used but most loosely defined
- Used for private thoughts (vehicle for communicating)
- Used to explain a concept or an idea that is being taught
- Used to show how a problem was solved
- Should always have a clear defined purpose for writing in journal

**Problem Solving**
- Solve a problem and write to explain why the solution is correct
- Explain  reasoning and processes used
- Convey to others why answer is correct
- Students need to convince themselves why they are correct
- Use a single problem printed at the top of the page and encourage students to include drawings or any form of explanation that helps the reader understand the solution
- Focus on a single problem

**Explaining an Idea**
- Different from problem solving in that students  are explaining ideas
- Explain what three-fourths means
- Show me what you know about the number 10
- Why does length X width give you the area of a rectangle?
- Should closely follow the development/teaching of an idea

**Reflective Writing**
- General feel for students' perspectives on a unit
- How they think they understand
- What they like or dislike about math or the topic
- May go in journals where the writing is private
- "If mathematics were an animal, it would be….  Why?
- "The thing I like best about mathematics is….  Why?
- The hardest part of the this chapter on subtraction is….  Why?
- I need help with _____ because….
- To me, geometry means….
- I think the answer is _____.  I think this because….

**Practical Suggestions:**
- Before a writing prompt, conduct  a class discussion on the same topic
- Write ideas on the board in shortened phrases
- Make a list of key words
- Do not impose your language, but rather, record ideas using the terminology of students
- Might have students brainstorm
- Draw a mind map on the board showing how one idea is connected to another
- Let students use notes or mind maps from class discussions
- Write often (3 times a week)
- Share some of the students' writing as models of what it means to write

- Take advantage of computers
- Model writing for students (chalkboard, overhead, charts)

**Helping Young Writers**
- Giant journals—students share and teacher records
- Have students dictate what they want to write
- Suggest they use words, numbers, and pictures to show their ideas

# V. Leon County Schools Writes Upon Request Rubrics: Grade 1

**SCORE POINTS IN RUBRIC**

The rubric further interprets the four major areas of consideration into levels of achievement. The rubric used to score papers for Leon County's 1st Grade WUR Assessment is shown below.

**6 Points**  The writing is focused on the topic, has a clear organizational pattern (including a beginning, middle, and end), and has ample development of the supporting ideas. The paper demonstrates a sense of completeness or wholeness. The paper demonstrates a strong command of language, including precision in word choice. The conventions of capitalization and punctuation are generally followed. Most commonly used words are spelled correctly. Subject/verb agreement and verb and noun forms are generally correct. With few exceptions, the sentences are complete, except when fragments are used purposefully. Various sentence structures are used. The paper is easy to read, and the teacher does not need to ask the student to decipher any of the writing.

**5 Points**  The writing is focused on the topic, with adequate development of the supporting ideas. It has a clear organizational pattern with a well-developed beginning, middle, and end, although a few lapses may occur. The paper demonstrates a sense of a sense of completeness or wholeness. Word choice shows an attempt to use higher level vocabulary. Most sentences are complete, although a few fragments may occur. There may be occasional errors in subject/verb agreement and in standard forms of verbs and nouns but not enough to impede communication. The conventions of punctuation, capitalization, and spelling are generally followed. Various sentence structures are used. The paper is easy to read, and the teacher does not need to ask the student to decipher any of the writing.

**4 Points**  The writing is focused on the topic. It has a logical organizational pattern including a beginning, middle, and end. The paper has a sense of completeness or wholeness. There are supporting examples. Word choice is generally adequate. The conventions of capitalization, punctuation, and spelling are generally followed. With few exceptions, sentences are complete. There is an attempt to use a variety of sentence structures, although most are simple constructions. The paper is easy to read, and the teacher does not need to ask the student to decipher any of the writing.

**3 Points**          The writing is generally focused on the topic, although it may contain some extraneous or loosely related information.  An organizational pattern has been attempted.  The paper may have a sense of completeness or wholeness.  There is evidence of supporting details or ideas.  Word choice is adequate but may be limited and/or predictable.  Knowledge of the conventions of punctuation and capitalization is demonstrated.  High frequency words are generally spelled correctly.  Spelling approximations for more advanced words are evident.  Most sentences are complete.  Overall the paper is easy to read, although some words may need to be deciphered by the student.

**2 Points**          The writing may be slightly related to the topic and/or offers little relevant information and few supporting examples.  The writing that is relevant to the topic exhibits little evidence of an organizational pattern.  The paper may lack a sense of completeness or wholeness.  Word choice may be limited.  Frequent errors may occur in basic punctuation and capitalization, and commonly used words may be frequently misspelled.  Sentences may not be complete.  The teacher has to ask the student to decipher a minimal number of words.

**1 Point**          The writing may only minimally address the topic because there is little, if any, development of supporting examples and unrelated information may be included.  The writing that is relevant to the topic does not exhibit any organizational pattern.  Word choice may be inadequate.  Frequent errors in spelling, capitalization, punctuation, and sentence structure may impede communication.  The teacher has to ask the student to decipher all or most of his/her writing.

**Unscorable**          The paper is unscorable because…
- the response is not related to what the prompt requested the student to do.
- the response is simply a rewording of the prompt.
- the response is a copy of a published work.
- the student refused to write.
- the response is illegible and the student is unable to read his/her own writing.
- the response is incomprehensible (words are arranged in such a way that no meaning is conveyed).
- the response is written in a foreign language.
- the response contains an insufficient amount of writing to determine if the student was attempting to address the prompt.

# Florida Writing Assessment—Holistic Rubric for Grade 8

## Points  Description

6    The writing is focused, purposeful, and reflects insight into the writing situation. The paper conveys a sense of completeness and wholeness with adherence to the main idea, and its organizational pattern provides for a logical progression of ideas.  The support is substantial, specific, relevant, concrete, and/or illustrative. The paper demonstrates a commitment to and an involvement with the subject, clarity in presentation of ideas, and may use creative writing strategies appropriate to the purpose of the paper.  The writing demonstrates a mature command of language (word choice) with freshness of expression.  Sentence structure is varied, and sentences are complete except when fragments are used purposefully.  Few, if any convention errors occur in mechanics, usage, and punctuation.

5    The writing focuses on the topic, and its organizational pattern provides for a progression of ideas, although some lapses may occur.  The paper conveys a sense of completeness or wholeness.  The support is ample.  The writing demonstrates a mature command of language, including precision in word choice. There is variation in sentence structure, and, with rare exceptions, sentences are complete except when fragments are used purposefully.  The paper generally follows the conventions of mechanics, usage, and spelling.

4    The writing is generally focused on the topic but may include extraneous or loosely related material.  An organizational pattern is apparent, although some lapses may occur.  The paper exhibits some sense of completeness or wholeness.  The support, including word choice, is adequate, although development may be uneven.  There is little variation in sentence structure, and most sentences are complete.  The paper generally follows the conventions of mechanics, usage, and spelling.

3    The writing is generally focused on the topic but may include extraneous or loosely related material.  An organization pattern has been attempted, but the paper may lack a sense of completeness or wholeness.  Some support is included, but development is erratic.  Word choice is adequate but may be limited, predictable, or occasionally vague.  There is little, if any, variation in sentence structure.  Knowledge of the conventions of mechanics and usage is usually demonstrated, and commonly used words are usually spelled correctly.

2    The writing is related to the topic but includes extraneous or loosely related material.  Little evidence of an organizational pattern may be demonstrated, and the paper may lack a sense of completeness or wholeness. Development of support is inadequate or illogical.  Word choice is limited, inappropriate, or vague. There is little, if any, variation in sentence structure, and gross errors in sentence structure may occur.  Errors in basic conventions of mechanics and usage may occur, and commonly used words may be misspelled.

1       The writing may only minimally address the topic.  The paper is a fragmentary or incoherent listing of related ideas or sentences or both.  Little, if any development of support or an organizational pattern or both is apparent.  Limited or inappropriate word choice may obscure meaning.  Gross errors in sentence structure and usage may impede communication.  Frequent and blatant errors may occur in the basic conventions of mechanics and usage, and commonly used words may be misspelled.

0       The paper is unscoreable in one of several ways.  The response is not related to what the prompt requested the student to do. The response is simply a rewording of the prompt. The response is a copy of a published work.  The student refused to write. The response is written in a foreign language. The response is illegible. The response is incomprehensible (words are arranged in such a way that no meaning is conveyed). The response contains an insufficient amount of writing to determine if the student was attempting to address the prompt.  The writing folder is blank.

Grades 4 and grades 10 rubrics vary slightly and may be obtained from Marty Beech, Center for Performance Technology, Florida State University.

The contributing source: *Florida Writes!* Florida Department of Education, Tallahassee, FL., 1998.

# VI. Six-Trait Assessment For Beginning Writers

## 1 EXPERIMENTING

### IDEAS
__Uses scribbles for writing
__Dictates labels or a story
__Shapes that look like letters
__Line forms that imitate text
__Writes letters randomly

### ORGANIZATION
__Attempts to write left to right
__Attempts to write top/down
__No sense of beginning and end yet
__Experiments with spacing

### VOICE
__Communicates feelings with color, shape, line in drawing
__Work is similar to everyone else's
__Ambiguous response to task
__Awareness of audience not present

### WORD CHOICE
__Writes letters in strings
__Imitates word patterns
__Pictures stand for words and phrases
__Copies environmental print

### SENTENCE FLUENCY
__Mimics letters and words across the page
__Words stand alone
__Patterns for sentences not in evidence
__Sentence sense not yet present

### CONVENTIONS
__Writes letter strings (pre-phonetic: dmRxzz)
__Attempts to create standard letters
__Writes word strings
__Attempts spacing of words, letters, symbols or pictures
__Student interpretation needed to understand text/pictures

## 2 EMERGING

### IDEAS
__Some recognizable words present
__Labels pictures
__Uses drawings that show detail
__Pictures are supported by some words

### ORGANIZATION
__Consistently writes left to right
__Consistently uses top/down
__Experiments with beginnings
__Begins to group like words/ pictures

### VOICE
__Hints of voice present in words and phrases
__Looks different from most other
__Energy/mood is present
__Treatment of topic predictable
__Audience is fuzzy-could be anybody, anywhere

### WORD CHOICE
__Recognizable words
__Environmental words used correctly
__Attempts at phrases
__Functional language

### SENTENCE FLUENCY
__Strings words together into phrases
__Attempts simple sentences
__Short, repetitive sentence patterns
__Dialogue present but not understandable

### CONVENTIONS
__Attempts semi-phonetic spelling (MTR, UM, KD, etc.)
__Uses mixed upper and lower case letters
__Uses spaces between letters and words
__Random punctuation
__Nonstandard grammar is common

## 3 DEVELOPING

### IDEAS
__Attempts a story or to make a point
__Illustration supports the writing
__Meaning of the general idea
__Some ideas clear but some are still fuzzy

### ORGANIZATION
__A title is present
__Limited transitions present
__Beginning but no ending, except "The End"
__Attempts at sequencing

### VOICE
__Expresses some predictable feelings
__Moments of individual sparkle, but then hides
__Repetition of familiar ideas reduces energy
__Awareness that the writing will be read by someone else
__Reader has limited connection to writer

### WORD CHOICE
__General or ordinary words
__Attempts new words but they don't always fit
__Settles for word or phrase that "will do"
__Big words used only to impress readers
__Relies on slang, clichés, or repetition

### SENTENCE FLUENCY
__Uses simple sentences
__Sentences tend to begin the same
__Experiments with other sentence patterns
__Reader may have to reread to follow the meaning
__Dialogue present but needs interpretation

## CONVENTIONS

__Uses phonetic spelling (MOSTR, HUMN, KLOSD, etc.) on personal words
__Spelling of high frequency words still spotty
__Uses capitals at beginning of sentences
__Usually uses end punctuation correctly (.!?)
__Experiments with other punctuation
__Long paper may be written as one paragraph
__Attempts standard grammar

# 4 CAPABLE

## IDEAS

__Writing tells a story or makes a point
__Illustration (if present) enhances the writing
__Idea is generally on topic
__Details are present but not developed (lists)

## ORGANIZATION

__An appropriate title is present
__Attempts transitions from sentence to sentence
__Beginning works well and attempts an ending
__Logical sequencing
__Key ideas begin to surface

## VOICE

__Writing is individual and expressive
__Individual perspective becomes evident
__Personal treatment of a standard topic
__Writes to convey a story or idea to the reader
__Attempts non-standard point of view

## WORD CHOICE

__Uses favorite words correctly
__Experiments with new and different words with some success
__Tries to choose words for specificity
__Attempts to use descriptive words to create images

## SENTENCE FLUENCY

__Simple and compound sentences present and effective
__Attempts complex sentences
__Not all sentences begin the same
__Sections of writing have rhythm and flow

## CONVENTIONS

__Transitional spelling on less frequent words (MONSTUR, HUMUN, CLOSSED, etc.)
__Spelling of high frequency words usually correct
__Capitals at the beginning of sentences and variable use on proper nouns
__End punctuation is correct (.!?) and other punctuation is attempted (such as commas)
__Paragraphing variable, but present
__Noun/pronoun agreement, verb tenses, subject/verb agreement

# 5 EXPERIENCED

## IDEAS

__Presents a fresh/original idea
__Topic is narrowed and focused
__Develops one clear, main idea
__Uses interesting, important details for support
__Writer understands topic well

## ORGANIZATION

__An original title is present
__Transitions connect main ideas
__The opening attracts
__An effective ending is tried
__Easy to follow
__Important ideas stand out

## VOICE

__Uses text to elicit a variety of emotions
__Takes some risks to say more than what is expected
__Point of view is evident
__Writes with a clear sense of audience
__Cares deeply about the topic

## WORD CHOICE

__Everyday words used well
__Precise, accurate, fresh, original words
__Creates vivid images in a natural way
__Avoids repetition, clichés or vague language
__Attempts at figurative language

## SENTENCE FLUENCY

__Consistently uses sentence variety
__Sentence structure is correct and creative
__Variety of sentence beginnings
__Natural rhythm, cadence and flow
__Sentences have texture which clarify the important idea

## CONVENTIONS

__High frequency words are spelled correctly and very close on other words
__Capitals used for obvious proper nouns as well as sentence beginnings
__Basic punctuation is used correctly and/or creativity
__Indents consistently to show paragraphs
__Show control over standard grammar

# Reading Programs/Methods/Strategies

| | Apalachee | Astoria Park | Bond | Brevard | Buck Lake | Canopy Oaks | Chaires | DeSoto Trail | Fairview | Ft. Braden (K-8) | Gilchrist | Hartsfield | Hawks Rise | Killearn Lakes | Moore | Oak Ridge | Pineview | Riley | Ruediger | Sabal Palm | Sealey | Springwood | Sullivan | Wesson | Woodville | Bellevue | Cobb | Deerlake | Fairview | Griffin | Nims | Raa | Swift Creek | PACE | Second Chance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accelerated Reader | X | X | X | X | X | X | X | X | | X | X | X | X | X | X | | X | X | | X | X | | X | | | X | | | X | | X | | | | |
| Blast Off | | | X | X | X | X | X | | | X | X | X | | | | | X | X | | X | | | | | | | | | | | | | | | X |
| Caught Ya (Writing) | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | X |
| Four Blocks | | | | | | | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Great Leaps | | X | X | | X | X | X | | | X | X | X | X | | X | | | | | X | X | X | | | X | X | X | | | | | | | | X |
| Open Court | | | X | X | X | X | X | | | X | X | X | | | | | | | X | X | X | X | | | | X | X | | | | | | | | |
| PALS | | | X | X | X | X | | X | | | | X | X | | X | | | X | X | | X | | | | | | X | | | | X | | | | |
| Paraphrasing Strategy (RAP) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reading PALS | | | | | X | | | | | | X | | | | | | | | | X | | X | | | X | | X | | | | | | | | X |
| Sing, Spell, Read, Write | | | | | | | | | | | | | | | | | | | | X | | X | | | | | | | | | | | | | |
| SRA Corrective Reading | | | X | X | X | X | X | | | X | X | X | | | | | | X | | X | X | X | | | X | X | X | X | | X | | | X | X | |
| SRA Reading Mastery | | | X | X | X | X | X | | | X | X | X | | | | | | X | | X | X | | | | X | | X | X | | | | | X | X | |
| Touch Phonics | | | | | X | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | |
| Vocabulary Cartoons-Vocabutoons | | | | | | | | | | X | X | | | | | | X | | | X | | | | | X | | X | | | | | | X | | X |
| Waterford | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wordly Wise | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# Reading Assessment Tools

| | Apalachee | Astoria Park | Bond | Brevard | Buck Lake | Canopy Oaks | Chaires | DeSoto Trail | Fairview | Ft. Braden (K-8) | Gilchrist | Hartsfield | Hawks Rise | Killearn Lakes | Moore | Oak Ridge | Pineview | Riley | Ruediger | Sabal Palm | Sealey | Springwood | Sullivan | Wesson | Woodville | Bellevue | Cobb | Deerlake | Fairview | Griffin | Nims | Raa | Swift Creek | PACE | Second Chance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kaufman Test of Ed. Achievement | | X | X | | X | X | X | X | | X | X | X | X | | X | | | | | X | X | | | | X | X | X | X | | | | | | X | |
| Open Court Comprehension checklists | | X | | X | X | X | | | | X | X | | | | | | | | | X | X | | | | X | | | | | | | | | | |
| Running Records | X | | X | X | X | X | | X | | X | | | | | | | | | | X | X | | X | | X | | | | | | | | | | |
| SRA Mastery Tests | | X | | | X | X | | | | | X | X | X | | | | X | X | | X | X | | X | | X | | X | | | | | | | X | |
| SRA Placement Tests | | X | X | | X | X | X | | | X | X | X | | | | | X | X | | X | | | | | X | X | X | X | | | | | X | | |
| STAR | X | X | X | X | | | X | | | X | X | X | X | | X | | X | | | | X | | X | | X | X | | | | | | | | | |
| TOPA | X | | | | | | | | | | X | X | X | X | | | | | | | | | X | X | X | | | | | | | | | | |
| TOWRE | X | | | | | | | | | | | X | | X | | | | | | | | | X | | X | | | | | | | | | | |
| Woodcock Johnson | | X | X | X | X | | X | | | X | X | X | | | X | | | | | X | | X | X | X | X | | | | | | | | | | X |

# Whatever It Takes

## Math Programs

| Program | Apalachee | Bond | Buck Lake | Astoria Park | Brevard | Canopy Oaks | Chaires | DeSoto Trail | Ft. Braden(k-8) | Gilchrist | Hartsfield | Hawks Rise | Killearn Lakes | Moore | Oak Ridge | Pineview | Riley | Ruediger | Sabal Palm | Sealey | Springwood | Sullivan | Wesson | Woodville | Belle Vue | Cobb | Deerlake | Fairview | Ft. Braden(k-8) | Griffin | Nims | Raa | Swift Creek | Chiles | Godby | Leon | Lincoln | Rickards | S.A.I.L. | PACE Secondary | Second Chance | Adult Educatn | Lively |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AIMS | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | X | | | | |
| CCC Lab | | | X | X | | | | | | X | X | X | | | | X | | X | | X | | X | X | | | X | | X | X | X | X | | X | | | | | X | | | | | |
| Connected Math (CMP) | | | | | | X | | | | | | | | | | | | | | | | | | | X | X | | X | X | X | X | | X | | | | | | | | | | |
| Connecting Math Concepts (SRA) | | | | | | | | | X | | | | | | | | | | | | | | | | X | | | | | | X | | | | | | | | | | | | |
| Corrective Math (SRA) | | | | | | | | | | X | | | | | | | | | | | | | | | | X | | X | X | X | X | | X | | | | | | | | | | |
| Family Math | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hands On Equations | | | | | | X | | X | | X | | X | X | | | | | | | X | X | X | | | | | | | | | X | | | | | X | X | | X | | | | |
| HSCT Diagostic | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | X | X | X | X | | | | X |
| Josten's | | | | | X | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | X | | X | | | | | X |
| Math Their Way | | | | | | | | | | | | | X | | | | | | | | | X | | | | | | | | | | | | | | | | X | | | | | |
| MEBA | X | X | X | | | | X | X | X | X | | X | X | X | X | X | | | X | | X | X | X | | | | | | | | | | | | | | | | | | | | |
| Mr. GoodMath | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | |
| PASS | | | | | | | | | | | | | | | | | | | | | | | | | X | X | | X | | | | | | | | X | | | | X | | |
| Precision Teaching | | | | | | X | | | | | | | | | | | | | X | | | | | | X | X | | X | | | X | | | | | | | | | | | | |
| Skillsbank Cornerstone Math | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | |
| Strategic Math Series | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | |
| Sunshine Math | X | X | X | | | | X | X | X | X | | X | X | X | X | X | | | X | X | X | X | X | | | | | | | | | | | | | | | | | | | | |

## Math Assessment Tools

| Tool | Apalachee | Bond | Buck Lake | Astoria Park | Brevard | Canopy Oaks | Chaires | DeSoto Trail | Ft. Braden(k-8) | Gilchrist | Hartsfield | Hawks Rise | Killearn Lakes | Moore | Oak Ridge | Pineview | Riley | Ruediger | Sabal Palm | Sealey | Springwood | Sullivan | Wesson | Woodville | Belle Vue | Cobb | Deerlake | Fairview | Ft. Braden(k-8) | Griffin | Nims | Raa | Swift Creek | Chiles | Godby | Leon | Lincoln | Rickards | S.A.I.L. | PACE Secondary | Second Chance | Adult Educatn | Lively |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accelerated Math | | | | X | | | | | | | | X | | X | X | X | | | | X | | | X | | X | X | | X | | | X | X | X | | | X | X | X | X | | | | |
| CCC Diagnostic | X | | | | | | | | | | X | X | | | | | | | | X | | | | | X | X | X | X | | | X | X | X | | | | X | X | X | | | | |
| Josten's | | | | | X | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | X | | X | X | | | | X |
| Star Math | | X | X | | | | | | | | | | | | | X | | | X | | | | | | | | | | | | X | X | | | | | | | X | | | | |
| Woodcock Johnson | | | | X | | | | | | X | X | | | | | | | | | | | | X | | | | | | | | | | | | | X | | | | | | | |

# VIII. Math Manipulatives Materials for Classroom

## Kindergarten–Second Grade

- ✓ Classroom set of four-function calculators
- ✓ Overhead counter
- ✓ Counters
- ✓ Pattern Blocks
- ✓ Base-ten Blocks/ hundred boards
- ✓ Multi-link cubes/Dice
- ✓ Play money
- ✓ Clock dials
- ✓ Geoboards
- ✓ Balance scale and weights
- ✓ Thermometer
- ✓ Measuring cups
- ✓ Tangrams
- ✓ Fraction circles/bars
- ✓ Dominoes
- ✓ Attributes
- ✓ Geometric shapes
- ✓ Sprinners

## Third through Fifth Grade

- ✓ Classroom set of four-function calculators
- ✓ Overhead counters
- ✓  Pattern blocks
- ✓ Base-ten blocks
- ✓ Two-color counters
- ✓ Multi-link cubes
- ✓ Fraction bars
- ✓ Play money
- ✓ Clock dials
- ✓ Geoboards
- ✓ Spinners
- ✓ Number cubes
- ✓ Rulers (inch and centimeter)
- ✓ Measuring tapes
- ✓ Protractors
- ✓ Compasses
- ✓ Balance scale and weights
- ✓ Thermometer
- ✓ Measuring cups
- ✓ Hands-on Equations kit
- ✓ Fraction dominoes
- ✓ Tangrams
- ✓ Pentominoes
- ✓ Attribute blocks

## Sixth through Eighth Grade

- ✓ Classroom set of graphing calculators
- ✓ Shape sets
- ✓ Angle rulers
- ✓ Centimeter cubes
- ✓ Measuring tapes
- ✓ Rulers/Meter sticks
- ✓ Spinners
- ✓ Protractors
- ✓ Compasses
- ✓ Two-color counters
- ✓ Overhead Counters
- ✓ Geoboards
- ✓ Thermometer
- ✓ Number cubes
- ✓ Algebra tiles
- ✓ Hands-on Equations kit
- ✓ Fraction bars
- ✓ Decimal manipulatives
- ✓ Fraction dominoes

## High School

- ✓ Classroom Set of Graphing Calculators
- ✓ Algebraic Tiles
- ✓ Hands-on-Equations kit
- ✓ Protractors
- ✓ Rulers/Meter Sticks
- ✓ Compasses
- ✓ Tessellation Sets
- ✓ Pentominoes
- ✓ Spinners
- ✓ Dice
- ✓ Geometric Shapes
- ✓ Tangrams
- ✓ Two-color counters

# IX. Research Web Sites

http://www.ncrel.org/mands/docs/7-3.htm
Site contains an article, "Another Myth About Math" by Dr. Arthur Hyde from National-Louis University.

http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma600.htm
North Central Regional Laboratory website with information about implementing curriculum instruction and assessment in mathematics

http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma0.htm
North Central Regional Laboratory website with information about the significance of the NCTM standards to the pathways critical to math

http://www.ncrel.org/sdrs/areas/ma0cont.htm
North Regional Laboratory website with information about equity in math education, hands-on learning, aligning standards, and using Internet based math materials

http://change.enc.org
Eisenhower National Clearinghouse for Math & Science Education's website about teacher change and improving K-12 mathematics

http://www.enc.org/reform/ideas/133273/index.htm
Site contains an article, "Ideas that Work in Mathematical Professional Development" by Susan Loucks-Horsley

http://www.ericec.org
Ask Eric Clearinghouse on Disabilities and Gifted Children

http://nces.ed.gov/nationsreportcard/math/math.asp
Department of Education's site on National Assessment of Educational Progress in Mathematics

http://www.ed.gov/pubs/StateArt/Math/
Site contains an article, "Ideas for Transforming Math Teaching and Learning"

http://www.mdk12.org/practices
Maryland Department of Education site with many educational research topics, particularly success for all students

http://7-12educators.miningco.com/msub62math.htm
Secondary school math site with both research and resources

http://www.ed.gov/databases/ERIC_Digests/ed370881.html
Site contains an article, "The Essential Elements of Group Learning" as it relates to math

http://www.nwrel.org/scpd/natspec/catalog/index.html
Northwest Regional Education Laboratory catalog of school reform research

http://www.nwrel.org/scpd/natspec/catalog/connected.htm
Research based information about Connected Math series

http://www.carson.enc.org:80/rf.htm
Eisenhower National Clearinghouse Resource Finder

http://www.ams.org/mathweb/mi-journals2.html
American Math Society's listing of all electronic math journals

http://www.ams.org/mathweb/mi-journals5.html
American Math Society's listing of all printed math journals with web links where possible

http://www.cs.unb.ca/~alopez-o/math-faq/index.html
Research based Frequently Asked Questions in Math site, updated regularly

http://www.nctm.org
National Council of Teachers of Mathematics Website—excellent overall site

# Resource Web Sites

http://archives.math.utk.edu/software/.mac.directory.html
Archived list of math shareware software for all different math sources

http://forum.swarthmore.edu
Website for the Math Forum—contains discussion groups, resources, problem of the week, ask Dr. Math, and key issues and innovations in math

http://sln.fi.edu/fi/hotlists/math.math.html
Mathematics Hotlist of over 80 math related sites applicable to all levels of math

http://www.ceismc.gatech.edu/busyt/math.html
Georgia Tech site with resources, games, books, lesson plans all related to math

http://www.mathstories.com
Site contains loads of activities and stories in math

http://teams.lacoe.edu/documentation/places/math.html
Los Angeles County schools teams distance learning web site with math activities and resources

http://www.clarityconnect.com/webpages/terri/sites.html
Site put together by math teacher with excellent links and resources to other great math sites

http://www.funbrain.com/kidscenter.html
Funbrain is a site with a variety of math games in all of the different strands—also parents
section

http://www.k12.ut.us/utahlink/train/manuals/mathed/elemenmath.htm
Utah Link's website of internet content math sites—links to many popular and proven math sites

http://www.math.ttu.edu/~dmettler/title.html
Education Professor Donna Mettler's home page grew out of a graduate class and now has many
links to software, sites, and math professional organizations

http://www.safari.net/~rooneym
Mr. Goodmath site—a must visit!!

http://www.aimsedu.org/puzzle/puzzlelist.html
Sponsored by AIMS, this site has a monthly puzzle students can solve and check as well as
archived puzzles

http://archives.math.utk.edu/k12.html#topics
Another hotlist of many teaching materials, software, and site links for math in grades K-12

http://www.c3.lanl.gov/mega-math/
A math site put together by Los Alamos, this contains excellent areas of content with appropriate
research and evaluation—very colorful and inviting site!

| Website | Topic | Reading | Writing | Math | Parents |
|---|---|---|---|---|---|
| http://idea.uoregon.edu/~ncite/do-cuments/techrep/tech19.html | Emergent Literacy | X | X | | |
| http://teams.lacoe.edu/ | Los Angeles County Office of Education Resources for Teachers | X | X | X | X |
| www.ed.gov/inits/americareads | The America Reads Challenge | X | | | X |
| www.cffl.org. | Caring for Children with Aids | | | | X |
| www.csus.edu/ier/reading.html | Building a Powerful Reading Program | X | | | |
| www.nwrel.org | Wonderful source of research & info for parents;Has teaching guides  for assisting students in organizational & writing skills | X | X | X | X |
| http://www.aasa.org/Issues/curren-tissues.htm | Current Issues and Ideas | X | X | X | |
| www.kidsource.com | Education & healthcare for parents | | | | X |
| www.ncte.org | Web page for National Council of Teachers of English (including research) | X | X | | |
| www.mdk12.org/practices | Maryland School Improvement Promising Practices | X | X | X | |
| http://ericec.org/ | Eric Clearinghouse-Research on all areas | X | X | X | |
| www.reading.org | Web page for International Reading Association | X | | X | |
| http://muskingum.edu/~cal/datab-ase/math.html | Muskingum College Math Strategies | | | X | |
| http://www.indiana.edu/~eric_rec-/ieo/digests/d126.html | Vocabulary instruction & reading comprehension  article | X | | | |
| http://www.sil.org/lingualinks/libr-ary/literacy | Literacy topics include: fluency, orthography, program planning, funding, recruitment & training, management & evaluation, etc. | X | | | |
| http://www.ldanatl.org:80/articles-/ncite/teachertips.html | Tips for teaching read-ing from the Learning to Read, Reading to Learn informational kit, developed by the National Center to Improve the Tools of Educators | X | | | X |

# References

## Reading/Language Arts References

Adams, M. (1990) *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Adams, M., Foorman, B., Lundberg, I., & Beeler, T. (1998). *Phonemic awareness in young children: A classroom curriculum.* Baltimore: Paul H. Brookes.

Adams, M., Treiman, R., & Pressley, M. (1998). Reading, writing, literacy. In E. Sigel & K. A. Renninger (Vol. Eds.). *Handbook of child psychology:* Vol. 4. *Child psychology in practice (5th ed.).* New York: Wiley.

Anderson, R., Hiebert, E., Scott, J., & Wilkinson, I. (1985*). Becoming a nation of readers: The report of the commission on reading.* (Contract No. 400-83-0057). Washington, DC: National Institute of Education.

Anderson, R., & Nagy, W. (1991). Word meanings. In R. Barr, M. L. Kamil, P.B. Mosenthal, and P. D. Pearson (Vol. Eds.), *Handbook of reading research* : Vol. 2. (pp. 690-724). New York: Longman.

Archer, A., and Gleason, M. (1994). *Skills for school success.* North Billerica, MA: Curriculum Associates.

Armstrong, T. (1996). *Multiple intelligences in the classroom.* Alexandria, VA: Association for Supervision and Curriculum Development.

Baker, S., Simmons, D., and Kameenui, E. (1998*). Vocabulary acquisition: Synthesis of the research.* http://idea.uoregon.edu/~ncite/documents/techrep/tech13.html

Beck, L., & McKeown, M. (1991). Conditions of vocabulary acquisition. In R. Barr, M. Kamil, P. Mosenthal, & P. D. Pearson (Vol. Eds.), *Handbook of reading research:* Vol. 2. (pp. 789-814). New York: Longman.

Berlinger, D., & Casanova, U. (1993). *Putting research to work in your school: "Are you teaching kids the right skills for remembering?"* New York: Scholastic.

Bermeister, L. (1978). *Reading strategies for middle and secondary school teachers.* (2nd ed.). Reading, PA: Addison Wesley.

Billmeyer, R. (1996) *Teaching reading in the content areas: If not me, then who?* (Contract Number RP91002005). Aurora, CO: McREL Resource Center.

Blachman, B. (1991). Getting ready to read: Learning how print maps to speech. In J. F. Kavanagh (Ed.), *The language continuum: From infancy to literacy.* Timonium, MD: York Press.

Brown, R., Pressley, M., Schuder, T., & Van Meter, P. (1994*). A quasi-experimental validation of transactional strategies instruction with previously low-achieving grade 2 readers.* College Park: University of Maryland, National Reading Research Center.

Brown, W. (1987). *ACT study power.* American College Testing.

Bulgren,J, Deshler, D., & Schumaker, J. (1997). *Concept mastery routine.* Lawrence, KA: Edge Enterprises.

Burchers, S., Burchers, M., & Burchers, B. (1997). Vocabutoons – Vocabulary Cartoons. Punta Gorda, FL : New Monic Books.

Calfee, R., Lindamood, P., & Lindamood, D. (1973). Acoustic-phonetic skills and reading: Kindergarten through 12th grade. *Journal of Education Psychology, 64.*

Cassidy, N., & Cassidy, J. (1986). *The book of kids songs: A holler-along handbook.* Palo Alto, CA: Klutz Press.

Chomsky, C. (1971). Write first, read later, *Childhood Education, 47,* 296-299. Newark, DE: International Reading Association.

Chomsky, C. (1979). Approaching reading through invented spelling. In. L. B. Resnick and P. A. Weaver (Eds.), *Theory and practice of early reading (Vol. 1).* Mahwah, NJ: Lawrence Erlbaum Associates.

Christen, W. & Murphy, T. (1991). *Increasing Comprehension by Activating Prior Knowledge.* ERIC Digest, Bloomington, IN: ERIC Clearinghouse on Reading, English, and Communication. [ED 328 885]

Clark, D. & Uhry, J. (1995). *Dyslexia: Theory and practice of remedial instruction* (2nd ed.). Baltimore: York Press.

Clay, M. (1985). *The Early Detection of Reading Difficulties: A Diagnostic Survey with Recovery Procedures* (3rd ed.),. Auckland: Heinemann.

Clay, M. (1993). *An observation survey of early literacy achievement.* Portsmouth, NH: Heinemann.

Clay, M. (March 1997). *Stones: Concepts about print tests.* Portsmouth, NH: Heinemann.

Cremshaw, S. R. (1985). *A semiotic look at kindergarten writing.* ERIC Clearinghouse #ED269765.

Cunningham, P. (1995). *Phonics they use* (2nd ed.). New York: Harper Collins College.

Dacus, S. (1986). The effects of writing, thinking instruction on the reading vocabulary and reading comprehension achievement of elementary students (Doctoral dissertation, Mississippi State University, 1986). *Dissertation Abstracts International, 47/08, A2868.*

Deshler, D., Schumaker, J., Lenz, B., & Roth, J. (1999).Content *Enhancement Routines,* Center for Research on Learning (C-R-L) Edge Enterprises, University of Kansas.

Diamond, L., & Mandel, S. (1995). *Building a powerful reading program: From research to practice.* Sacramento: California State University Institute for Educational Reform. http://www.csus.edu/ier/reading.html

Elley, W. (1989). Vocabulary acquisition from listening to stories. *Reading Research Quarterly 24,* 174-187.

Ellis, E. (1995). *Clarifying routine.* Lawrence, KS: Edge Enterprises.

Ellis, E. (1998). Th*e framing routine.* Lawrence, KS: Edge Enterprises.

Ellis, E. (1995). *The vocabulary strategy LINCS.* Lawrence, KS: Educational Enterprises.

Ericson, L. & Juliebo, M. F. (1998). *The Phonological Awareness Handbook for Kindergarten and Primary Teachers,.* Newark, DE: International Reading Association.

Fountas, I. & Pinnell, G. (1996). *Guided Reading, Good First Reading for all children.* Portsmouth, NH: Heinemann.

Gall, M., Gall, J., Jacobsen, D., Bullock, T. (1990). *Tools for learning: A guide to teaching study skills.* Alexandria, VA: Association for Supervision and Curriculum Development.

Gentry, J. (1993). *Teaching kids to spell.* Portsmouth, NH: Heinemann.

Harris, T. & Hodges, R. (1995). *The literacy dictionary: The vocabulary of reading and writing.* Newark, DE: International Reading Association.

Harris, A. J. & Sipay, E. R., (1975). *How to Increase Reading Abilities* (6th ed.) New York: David McKay Co.

Heimlich, J., & Pittelman, S. (1997). *Semantic mapping: Classroom applications.* Newark, DE: International Reading Association.

Henderson, E. (1990).  *Teaching spelling* (2ⁿᵈ ed.).  Boston: Houghton Mifflin.

Holdaway, D. (1997).  *The foundations of literacy.*  Sydney: Ashton Scholastic.

Honig, B. (1997).  Reading the right way: What research and best practices say about eliminating failure among beginning readers.  *The School Administrator, 54 (8),* 1-6.

Honig, B. (1996).  *Teaching our children to read: The role of skills in a comprehensive reading program.*  Thousand Oaks, CA: Corwin Press.

Hughes, C., Schumaker, J., Deshler, D., Mercer, C. (1993).  *The test taking strategy.*  Lawrence, KS: Edge Enterprises.

Jones, B., Palinscar, A., Ogle, D., & Carr, E. (1987*).  Strategic teaching and learning: Cognitive instruction in the content areas.*  Alexandria, VA: Association for Supervision and Curriculum Development and North Central Regional Education Laboratory.

Jones, R. (1995).  Writing wrongs.  *The Executive Educator, 17 (4),* pp. 18-24.

Juel, C. (1991).  Beginning reading.  In R. Barr, M. Kamil, P. Mosenthal, & P. Pearson (Eds.), *Handbook of Reading Research: Vol. 2,* 759-788.  White Plains, NY: Longman.

Kaiman, A. (1997).  *Preparing for the Florida writing assessment test, secondary level.*  New York: Amsco School Publishing

Krashen, S.  (1993).  *The power of reading.*  CA: Libraries Unlimited.

Kueker, J. (1990).  *Prereading Activities:  A Key to Comprehension.*  Paper presented at the International Conference on Learning Disabilities (Austin, TX).  [ED 360 785]

Lenz, B.,  Schumaker, J., Deshler, D.,  & Beals, V. (1996*).  The word identification strategy.*  Lawrence, KS: The University of Kansas.

Lyon, G.  (1995). Research In Learning Disabilities at the NICHD: Contributions from Scientists Supported by The National Institute of Child Health and Human Development.  Reprinted from *The Journal of Child Neurology*, *10,* 120-126.

 Manzo, A., & Manzo, U. (1995).  *Teaching children to be literate-A reflective approach.* Ft. Worth: Harcourt Brace College Publishers.

Martin, B. (1992).  *Brown bear, brown bear, what do you see?*  New York: Henry Holt.

Martin, J. A., and Friedberg, A. (1986).  *Writing to read.*  New York: Warner Books.

Mathes, P., & Howard, J. (1998).  Peer-assisted learning strategies for first-grade readers: Responding to the needs of diverse learners.  *Reading Research Quarterly, 33 (1)*

Moran, C., & Calfee, R. (1993).  Comprehending orthography: Social construction of letter-sound in monolingual and bilingual programs.  *Reading and Writing: An Interdisciplinary Journal, 5,* 205-225.

Montessori, M. (1964*).  The Montessori method.*  New York: Shocken Books

Nagy, W. (1989). *Vocabulary instruction: Implications of the new research*  (ERIC Document Reproduction Service  No. ED266405).  Paper presented at the meeting of the National Council of Teachers of English, Philadelphia.

Paris, S., Lipson, M., & Wixson, K. (1983).  Becoming a strategic reader.  *Contemporary Education Psychology, 8,* 293-316.

Pearson, P. & Dole, J. (May 1988).  *Explicit Comprehension Instruction:  A Review of Research and a New Conceptualization of Instruction.* Technical Report No. 427. ERIC Document Reproduction Service.

Pinnell, G. & Fountas, I. (1998).  *Word matters: Teaching phonics and spelling in ghte reading/ writing classroom*:  Portsmouth, NH: Heinemann.

Pittelman, S., Heimlich, J, Berglund, R., & French, M. (1991).  *Semantic feature analysis: Classroom application.*  Newark, DE: International Reading Association.

*Reading for life: The learner as a reader* (1997).  New Zealand Ministry of Education, Wellington, New Zealand: Learning Media Limited.

Richgels, D. (1987).  Experimental reading with invented spelling (ERIS): A preschool and kindergarten method.  *The Reading Teacher, 40,* 522-529.

Riegel, R., Mayle, J., & McCarthy-Kenkel, J. (1988*).  Beyond maladies and remedies.  Suggestions and guidelines for adapting materials for students with special needs in the regular class.*  Michigan: RHR Consultation Services.

Rothman, R. (1992).  In a pilot study, writing is gauged.  *Education Week, 11, 31:*24.

Samuels, S. (1985).  The method of repeated reading.  *The Reading Teacher, 32:* 403-408.

Schlafly, P. (1996).  An educator discovers phonics.  *The Phyllis Schlafly report, 29,* 12.

Schmoker, M. (1996).  *Results: The key to continuous school improvement.*  Alexandria, VA: Association of Supervisors of Curriculum Development.

Share, D. (1995).  Cognitive processes in early reading development: Accommodating individual differences into mode of acquisition.  Issues in education: Contributions from *Educational Psychology, 1,* 1-57.

Shepherd, D. (1978).  *Comprehensive high school reading methods* (2nd ed.). OH: Charles Merrill.

Smith, C*.,  Instruction & Reading Comprehension,* ERIC Clearinghouse on Reading, English, & Communication Digest #126.

Snow, C., Burns, S.,  & Griffin, P. (Eds.).  (1998).  Report of the committee on *Prevention of reading difficulties in young children.*  Washington, DC: National Academy Research Council.

Snow, C., Burns, S., & Griffin, P. (Eds.).  (1998)  *Preventing Reading Difficulties in Young Children.*  Washington, DC:  National Academy Press.

Snow, C., and Tabors, P. (1993).  Language skills that relate to literacy development.  In B. Spodel & O. Saracho (Eds.) *Language and literacy in early childhood education.*  Washington, DC: National Academy Research Council.

Spandel, V., Stiggins, R. (1997).  *Creating Writers – Linking Writing Assessment and Instruction.*  Addison Wesley Longman, Inc.

Spector, J. (1995).  Phonemic awareness training: Application of principles of direct instruction.  *Reading and Writing Quarterly: Overcoming Learning Difficulties, 11(1),* 37-51.

Stahl, S. et al. (1997).  Fluency-oriented reading instruction.  *Reading Research Report no. 79.*  Athens, GA: National Reading Research Center.

Stahl, S., & Fairbanks, M. (1986).  The effects of vocabulary instruction: A model-based meta-analysis.  *Review of Educational Research, 56,* 72-110.

Stanovich, K. (1993/1994).  Romance and reality.  *The Reading Teacher, 47,* 280-290.

Stanovich, K. (1993). Does reading make you smarter?  Literacy and the development of verbal intelligence.  In H. Reese (Ed.), *Advances in child development and behavior, 25.*  CA: Academic Press.

Stanovich, K. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy.  *Reading Research Quarterly, 21.*

Sturomski, N. (1997, August).  Teaching students with learning disabilities to use learning strategies: Interventions for students with learning disabilities.  *National Information Center for Children & Youth with Disabilities (NICHCY) News Digest, 25.* 1-19.  http://www.nichcy.org/pubs/newsdig/nd25txt.htm

Tomlinson, C. (1999).  *The differentiated classroom responding to the needs of all learners.*  Alexandria, VA: Association for Supervision and Curriculum Development.

Toms-Bronowshi, S. (1982).  *An investigation of the effectiveness of semantic mapping and semantic feature analysis with intermediate grade children.*  Unpublished doctoral dissertation, University of Wisconsin, Madison.

Torgesen, J., & Mathes, P. (1999).  *Assessment & instruction in phonological awareness* (1999).  Tallahassee, FL: Bureau of Instructional Support and Community Services, Florida Department of Education.

*Thirty years of research: What we know about how children learn to read.*  The center for the future of teaching and learning. (1998).  http://www.cftl.org/

Wade, T. (1978). *Promotion Patterns in the Junior School.*  Unpublished Masters Thesis.  University of Auckland.

Wagner, R., Torgesen, J., & Rashotte, C. (1994).  Development of reading-related phonological processing abilities: New evidence of bi-directional causality from a latent variable longitudinal study.  *Developmental Psychology, 30.*

Winebrenner, S. (1996).  *Teaching kids with learning dificulties in the regular classroom.*  Minneapolis: Free Spirit.

Yopp, H. (1992).  Developing phonemic awareness in young children.  *Reading Teacher*, 45 (9), 696-703.

# Math Research Resources

Armstrong, T. (1996).  *Multiple intelligences in the classroom.*  New York:  Association for Superivision and Curriculum Development.

Badian, N. A. (1983).  Arithmetic and nonverbal learning. *Progress in Learning        Disabilities, 5.*

Berlinger, D., & Cassanova, U. (1993).  *Putting research to work in your school: "Are you teaching kids the right skills for remembering?"*  New York: Scholastic.

Blay, N. S., & Thornton, C. A. (1995).  *Teaching mathematics to students with learning disabilities* (3rd ed.).  Austin, TX:  PRO-ED.

Bosch, K. A. & Bowers, R. S. (1992).  "Count me in, too": Math instructional strategies for the discouraged learner.  *The Clearing House, 66(2),* 104-106.

Campbell, P. & Langrell, C.  (1993).  Making equity a reality in classrooms.  *Arithmetic Teacher, 41,* 110-113.

Cardelle-Elawar, M. (1995).  Effects of metacognitive instruction on low achievers in mathematics problems.  *Teaching & Teacher Education, 11(10),* 81-95.

Carnine, Douglas.  (1991). Curricular interventions for teaching higher order thinking to all students:  Introduction to the Special Series.  *Journal of Learning Disabilities, 24*, 261-269.

Charles, L. (1990).  *Algebra thinking: First experiences.*  Mountain View, CA: Creative Publications.

Cisneros, S.  (1994). *House on Mango Street.*  New York: Random House. Curriculum and Evaluation Standards for School Mathematics.  (1993). National Council of Teachers of Mathematics.

DeCorte, E. & Verschaffel, L.  (1981). Children's Solution Processes in Elementary Arithmetic Problems:  Analysis and Improvement.  *Journal of Educational Psychology, 73,* 765-779.

Dessart, D. J., DeRidder, C. M., & Ellington, A. J. (1999). The Research Backs Calculators. *Mathematics Education Dialogues, 35*, 6.

Driscoll, M. J. (1980). *Research within reach: Elementary school mathematics, 1,* 515-524.

Driscoll, M. P., & Tessmer, M. (1985). *Applications of the concept tree and rational set generator for coordinate concept learning.* Tallhassee: Florida State University. (ERIC Document Reproduction Service No. ED 257 875)

Ellis, A. K. & Fouts, J.T. (1997) *Research on Educational Innovation.* Larchmont, NY: Eye on Education.

Fleischner, J.E., Nuzum, M.B., & Marzola, E.S. (1987) Devising an instructional program to teach arithmetic problem-solving skills to students with learning disabilities. *Journal of Learning Disabilities, 20,* 214-217.

Florida Mathematics Curriculum Framework. (1996). State of Florida, Department of State.

Garner, K. (1996). Math Learning Disabilities. World Wide Web: ([http://www.ldonline.org/ld_indepth/math_skills/garnett.html](http://www.ldonline.org/ld_indepth/math_skills/garnett.html))

Goodstein, M. A. & Kahn, H. (1974). Pattern of achievement among children with learning difficulties. *Exceptional Children, 50,* 47-49.

Herman, M. L. (1983). Hopeless in math? It's too soon to say. *Mathematics Teacher, 1,* 515-524.

Howe, R. & Kasten, M. (1992). *Students at risk in mathematics: Prevention and recovery in elementary schools:* ERIC Clearinghouse for science, mathematics, and environmental education. (Contract No. RI88062006). Columbus, OH: Ohio State University. (ERIC Document Reproduction Service No. ED 350 175)

Hutchinson, N. L. (1993). Effects of cognitive strategy instruction on algebra problem solving of adolescents with learning disabilities. *Learning Disability Quarterly, 16,* 34-63.

Kember, D. (1991). Instructional design for meaningful learning. *Instructional Science, 20,* 289-310.

Koscinski, S. T., & Gast, D. L. (1993). Use of constant time delay in teaching multiplication facts to students with learning disabilities. *Journal of Learning Disablities, 26(8),* 533-544, 567.

Ladson Billings, G. (1994). *Dreamkeepers: Successful Teachers of African-American Children.* San Francisco, CA: Jossey-Bass.

Lovitt, T. C. & Curtiss, K. A. (1968). Effects of manipulating an antecedent event on mathematics response rate. *Journal of Applied Behavior Analysis, 1*, 329-333.

Mathematics: Teacher resource handbook. (1993). A practical guide for k-12 mathematics. Thousand Oaks, CA: Corwin.

Mercer, C., Jordan, L., & Miller, S. (1994). Implications of constructivism for teaching math to students with moderate to mild disabilities. *The Journal of Special Education, 28(3),* 290-306.

Mevarech, Z., & Rich Y. (1985). Effects of computer-assisted mathematics instruction on disadvantaged pupils' cognitive and affective development. *Journal of Educational Research, 79(1),* 5-10.

Miller, S. & Mercer, C. (1993). Using a graduated word problem sequence to promote problem-solving skills. *Learning Disabilities Research & Practice, 8(3),* 169-174.

Miller, S. & Mercer, C. (1992) Teaching students with learning problems in math to acquire, understand, and apply basic math facts. *Remedial and Special Education, 13(3),* 19-35, 60.

National Association for the Education of Young Children. (1997). "NAEYC Position Statement."World Wide Web:(http://www.america-tomorrow.com/naeyc/position/ dap3.htm).

Paulos, J. A. The odds are you're Innumerate. *New York Times*, Book Review, January 1, 1989.

Pool, Carolyn R. (1998). A Safe and Caring Place. *Educational Leadership, 55*, 73-77.

Riegel, R., Mayle, J., & McCarthy-Kenkel, J. (1988). *Beyond maladies and remedies: Suggestions and guideline for adapting materials for students with special needs in the regular class.* Michigan: RHR Consultation Services.

Rivera, D. M., & Bryant, B. R. (1992). Mathematics instruction for students with special needs. *Intervention in School and Clinic, 28(2)*, 71-86.

Robinson, G. L. (1990). Synthesis of Research on the Effects of Class Size. *Educational Leadership 47,7*: 80-90.

Schmoker, M. (1996). *Results: The key to continuous school improvement.* VA: Association for Supervision and Curriculum Development.

Schulz, R. (1972). Characteristics and needs of the slow learner. In W.C. Lowery (Ed.), *The Slow Learner in Mathematics* (pp. 1-25). Washington, D.C.: National Council of Teachers of Mathematics.

Schweinhart, L. J., H. V. Barnes, and D. P. Weikart. (1993). *Significant Benefits: The High/Scope Perry Preschool Study Through Age 27.* Monograph No. 10. Ypsilanti, MI: High/Scope Educational Research Foundation.

Steen, L. A. (1987). Mathematics education: A predictor of scientific competitiveness. *Science, 237,* 251-252, 302.

Van de Walle, John A. (1998). *Elementary and Middle School Mathematics.* New York: Longman.

Vatter, T. (1992). Teaching mathematics to the at-risk secondary student. *The Mathematics Teacher, 85(4),* 292-294.