



Essential Learning Systems and Its Correlation to a  
**Successful Intervention for  
Left Occipitotemporal Systems**



Learning Solutions that are key to making a difference!™



One of the primary symptoms of reading disability is a lack of phonological awareness. Students without phonological awareness are not able to grasp the sound structures of individual words. Fortunately, early intervention can help students adjust to, if not overcome, the problem.

For the majority of children, educators address phonology instruction by incorporating the methods that the National Reading Panel (NRP) advocated in its 2000 report. The panel concluded that teachers should build phonological awareness by introducing activities to practice the isolation, identity, categorization, blending, segmentation, and deletion of the phonemes within words.

In May 2004, the Society of Biological Psychiatry published a study that revealed more information about building phonological awareness among students with learning disabilities. The study, *Development of Left Occipitotemporal Systems for Skilled Reading in Children After a Phonologically-Based Intervention*, suggests that phonological deficits occur when the left hemisphere posterior brain systems fail to function correctly during reading. The list of authors who conducted the study is virtually a *Who's Who* in educational studies: Bennett Shaywitz, Sally Shaywitz, Benita Blachman, Kenneth Pugh, Robert Fulbright, Pawel Skdularski, W. Einar Mencl, R. Todd Constable, John M. Holahan, Karen Marchione, Jack Fletcher, G. Reid Lyon and John Gore. These noted researchers hypothesized that the dysfunction was neurobiological, and, therefore, required neurobiological intervention.

### **The Study**

To prove their hypothesis, the authors conducted a year long study of 77 right-handed children with reading disabilities. To participate in the study, the children — who ranged from 6 to 9 years in age — must have scored below the twenty-fifth percentile on Word Identification or the Word Attack subtest of the Woodcock reading achievement tests. Children must also have scored below the twenty-fifth percentile when the scores of the subtests were averaged.

The children received 50 minutes of individual tutoring in their home schools each day. The tutoring focused on explicit and systematic instruction to help the children understand the alphabetic principle. The instruction included lessons that included five key activities:

- (1) a review of sound-symbol associations (e.g., giving the name, sound, and key word for each letter, as in 'a says /a/ as in apple');
- (2) practice in phoneme analysis and blending by manipulating letter cards or scrabble tiles to make new words (e.g., changing sat to sap to sip to slip);
- (3) timed reading of previously learned words to develop fluency;
- (4) oral reading of stories; and
- (5) dictation of words with phonetically regular spelling-sound patterns (e.g., chap, spin).

During their dictation practice, the tutors encouraged the children to say each word slowly before spelling it. This stretching of the word helps emphasize the phonologic and orthographic connections. Tutors could also incorporate additional activities toward the end of the lesson.



Instruction concentrated on the English language's six basic syllable patterns: "closed syllables, final 'e' syllables, open syllables, vowel team syllables, vowel + r syllables, and consonant + le syllables." As children showed gains in accuracy and fluency, they moved from reading words with just one syllable to reading multiple-syllable words composed of the syllable types they had already learned.

The children read books that featured mostly decodable words, as well as trade books that did not emphasize regular spelling and sound patterns. As they became better readers, they spent less time on the phonetically regular text and more time on various texts that would help them become more fluent, increase their comprehension skills and allow opportunities to read for pleasure.

Researchers monitored the students' brain activity patterns by performing functional magnetic resonance imaging (fMRI) before and after the intervention. They used the fMRI data to detect any changes in brain activation patterns. During the imaging process, students would hear a spoken letter, like "B"; then, they would see two letters, such as "B" and "T." The students pressed a key to indicate which letter they heard.

## The Results

Researchers used the Wiederholt and Bryant's Gray Oral Reading Tests (GORT) to assess the students' reading fluency. The GORT includes two forms, each with 14 developmentally sequenced reading passages followed by five comprehension questions. The assessment measures the students' reading rate, accuracy, fluency, comprehension and overall reading ability.

The fMRI data for students who participated in the experimental intervention indicated that there was increased activity in the left side of the brain. Because the brain activity increased as the students' reading skills increased, the authors were able to determine that the phonological intervention assisted the development of the neural systems responsible for skilled reading. More importantly, throughout the year after the intervention, the participants' occipitotemporal developments continued. The authors also found that as the systems on the left side of the brain developed, the systems on the right no longer needed to compensate for the left's lack of development.

This successful intervention revealed that phonologic reading intervention caused significant improvements in brain organization. The intervention also contributed to brain pattern development, specifically in the left occipitotemporal area, resembling that of a skilled reader. These results prove that **phonological interventions in young students significantly improve the development of the neural systems responsible for skilled reading and, in turn, enhance reading fluency.**

## Introducing Essential Learning Systems...

Since 1987, Creative Education Institute (CEI) has upheld its goal to develop learning solutions that are key to making differences ... differences that can be measured by results. In line with that goal, CEI developed Essential Learning Systems (ELS). ELS is cross-platform software that uses a multidimensional, therapeutic approach to address the reading, language and learning development needs of students of all ages.

ELS capitalizes on the brain's ability to develop more fluid pathways for automatic recognition, retention, recall, comprehension and application of information...pathways that are frequently underdeveloped in students with learning challenges. Our approach focuses on mastery, positive reinforcement and motivation, resulting in significant gains in grade-level equivalencies, test scores, self-esteem and overall performance. The ELS educational approach has experienced significant success because of its systematic instruction and universal design for learning. Learning takes place through a variety of modes. Learners may receive information through any of the senses, but learning is most effective when it occurs in multiple senses. This type of learning is called **multisensory learning.**

Multisensory learning is the key to CEI's learning process. ELS presents a series of exercises that stimulate the visual, auditory and motor pathways in the brain. This multisensory stimulation uses three modes to implant information:



- + ELS implants the sight-sound patterns of words by presenting information in one sensory mode.
- + The program then asks the student to recall the information using a second sensory mode.
- + Finally, the program asks the student to respond using a third sensory mode.

Although multisensory learning takes place in every ELS task, memory input occurs during a series of ELS exercises called SHARE (an acronym for **See, Hear And REspond**). As students complete these simple tasks with correct timing and sequencing, the brain interlocks the sensory pathways. These pathways are the basis for memory retention of any skill. Repetition of the skill reinforces it and places it firmly into long-term memory.

ELS helps students explore the letter-sound relationships through the SHARE activities in each lesson. ELS provides over two hundred masterfully structured SHARE lessons to support student learning using multisensory instruction. CEI used the majority of sight-sound combinations necessary for spoken and written English to create the ELS lessons. The program begins by forming words with simple patterns and then moves to more complex patterns:

c-v	consonant-vowel	as in "no"
v-c	vowel-consonant	as in "am"
c-v-c	consonant-vowel-consonant	as in "pan"
c-v-v-c	consonant-vowel-vowel-consonant	as in "pain"

Next, developers grouped the words and sequenced them into visual patterns based on the order in which speech naturally develops. The program first introduces plosive sounds, or sounds made with the lips, such as "p" and "b." It goes on to address the more difficult sounds, such as "k" and "g," that students produce with the tongue at the back of the mouth. According to sound patterns, developers then grouped ELS words into six levels:

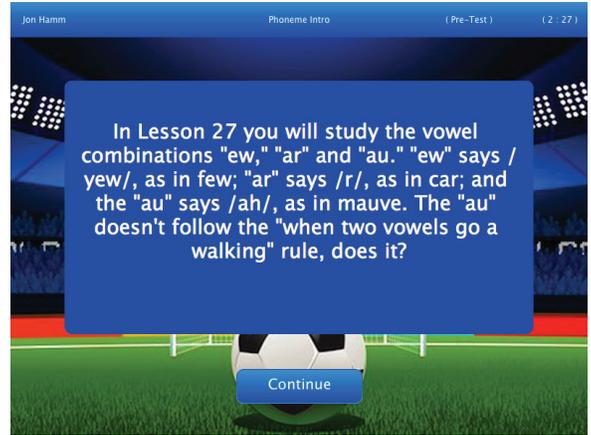
Level I	Short vowels
Level II	Digraphs
Level III	Long vowels
Level IV	Initial consonant clusters
Level V	Final consonant clusters
Level VI	Triple consonant clusters

Throughout the program's levels and lessons, students receive phonological instruction in the same ways that the students in the experimental intervention did. By the time students have completed a 45-minute session of ELS, they have performed more than 200 specifically-patterned exercises that correlate to the components of the successful intervention.



**Review of Sound-Symbol Associations**  
**(Giving the Name, Sound, and Key Word for Each Letter)**

Depending on the preferences the facilitator selected in the CEI Learning Manager, the lesson may begin with the Phoneme Introduction Screen. This screen informs the students of the phonemes they will be working on throughout the lesson by providing the letter, the sound it makes, and a key word featuring the sound. If the teacher selected Read Instructions Aloud as a parameter, the computer voice will read the introduction so that students can hear the pronunciations of the graphemes, or letter combinations.



**Practice in Phoneme Analysis and Blending**  
**(Manipulating Letters to Make New Words)**

The Word Building Worksheet helps students understand the relationships between the phonemes and graphemes in the ELS lesson words. Students receive phoneme analysis and blending practice by using the word endings and beginnings at the top of the assignment to create words.

WORD BUILDING                      LEVEL 2    LESSON 25

Name: Chuck Bartowski                      Date: Tuesday, June 2, 2009

**Directions: Use the letter group(s) below to fill in the blanks and make real words.**

awn awl aul auve aupe aud aub ause auze aught

1. d \_ \_ \_ \_                      8. l \_ \_ \_ \_

2. n \_ \_ \_ \_ \_                      9. c \_ \_ \_ \_ \_

3. m \_ \_ \_ \_                      10. S h \_ \_ \_ \_

4. P \_ \_ \_ \_                      11. p \_ \_ \_ \_ \_

5. h \_ \_ \_ \_                      12. t \_ \_ \_ \_ \_

6. m \_ \_ \_ \_ \_                      13. g \_ \_ \_ \_ \_

7. s h \_ \_ \_ \_                      14. t \_ \_ \_ \_ \_

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Creative Education Institute/Essential Learning Systems™ Masters, Word Building 2001-2009                      Product Version: 8.0.0 M



## Timed Reading of Previously Learned Words to Develop Fluency

Long Term Recall (LTR) continually checks whether or not students are transferring the information they learn to long-term memory. If they are storing patterns in memory, readers are better able to focus their attention on comprehension and associated reading skills. Due to the sequential nature of the ELS lessons, a student who does not truly master each sound pattern will have trouble with subsequent levels and lessons.

Twenty-one days after a student has completed an entire non-mastery lesson, the computer prompts the student to do Long Term Recall. The screen tells the student the level and lesson from which he should be reading. When the student is ready to begin, the teacher clicks the **START** button. The computer timer begins at this point, so the student should be prepared to read the words as soon as they appear on the screen. The student reads the words in the order that they appear on the screen. As the student reads each word, the facilitator should mentally note if a student struggles or hesitates on the word. A correct response on LTR requires a student to pronounce each word quickly and correctly.

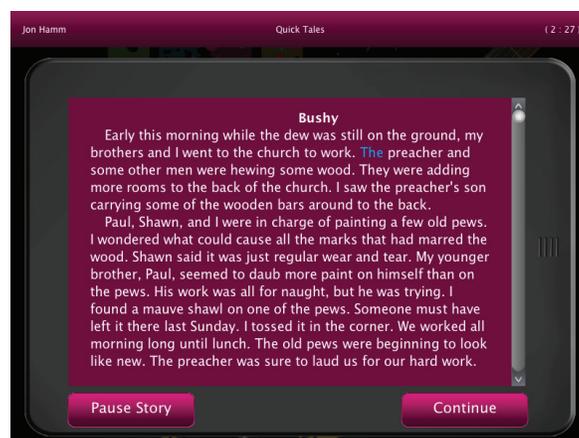
When the student has finished reading the words, the student or the facilitator should click the **STOP** button. This will stop the computer timer. The student completes the exercise for each non-mastery lesson. If the student struggles with the task, the program provides remediation.



## Oral Reading of Stories

Some sequences require the students to read Fluency Passages with the teacher. These passages are groups of simple sentences to help students who are learning to pronounce the lesson words.

Students also practice oral reading with the Quick Tales. These short stories use newly learned vocabulary words and comprehension questions to ensure reading application. Quick Tales give the student the option of reading along as the computer voice highlights each sentence and reads it aloud.





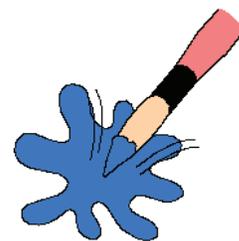
## Dictation of Words with Phonetically Regular Spelling-Sound Patterns

In Copy-Write, the student practices taking dictation from auditory prompts. Copy-Write develops the student’s listening and dictation skills, as well as his ability to call on memory. Copy-Write consists of three options — Copy-Write Words, Copy-Write Phrases, and Copy-Write Sentences. The Words option is much like a spelling test, testing the student’s immediate recall of one word. The student repeats the entire sentence spoken by the computer and then writes the lesson word on paper when prompted.

When the student completes Copy-Write, a screen appears telling the student to check his or her work. The student should use the Picture Reference/Answer Book to check his work and correct it before the facilitator checks it. This added requirement of the Copy-Write task gives the student practice distinguishing between correct and incorrect patterns of spelling, punctuation and grammar and develops editing ability. Many students with processing problems have difficulty finding their own mistakes. When the student finds an error, he should highlight or circle the error and rewrite the missed word.

**daub**

to cover or smear  
with a substance



(She will daub) some paint on the canvas.

**Example from Picture Reference/Answer Book**

**This example includes the word, the picture that represents the word, the definition and the sentence used in the lesson.**

## Summary of ELS’ Alignment with Study’s Lesson Steps

Lesson Step	ELS Activities
Review of sound-symbol associations	Phoneme Introductions
Practice in phoneme analysis and blending	Word Building Worksheet
Timed reading of previously learned words to develop fluency	Long Term Recall
Oral reading of stories	Fluency Passages and Quick Tales
Dictation of words with phonetically regular spelling-sound patterns	Copy-Write

## Evidence of Success

To take full advantage of ELS’ therapeutic nature, CEI recommends that students work on the program 45 minutes per day a minimum of five (5) days a week. Since the ELS program combines the use of software and supplementary materials to improve students’ reading ability, it is important to measure the changes that occur throughout the school year. To determine the extent of student achievement, CEI uses the **Diagnostic Screening Test: Reading (DST:R)**, developed by Thomas D. Gnagey, Psy. D, and Patricia A. Gnagey, MS.

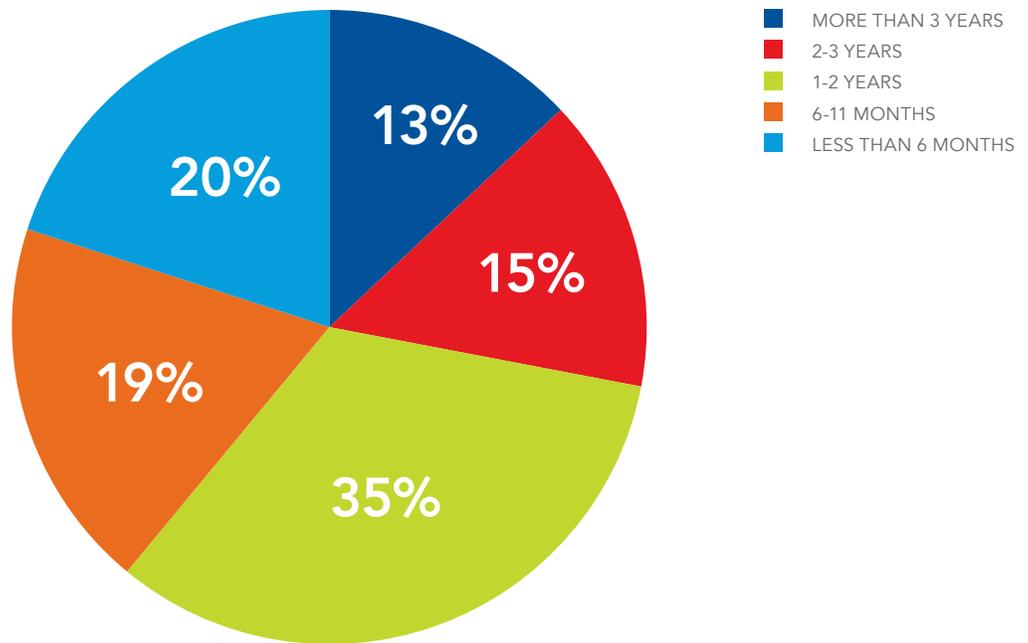
The DST:R is an individually administered evaluation that provides information on a student’s basic reading skills. Since facilitators administer a pre- and posttest, results show the gains each student made in basic reading skills and concepts while working on the ELS program. The DST:R is a quick, valid method for gathering information about a student’s reading skills. Each subtest provides a grade level equivalent. Additionally, the test computes four major scores:



- + **Word Reading Comfort Level** — The level at which the student knows almost all of the words and reads each without assistance.
- + **Word Reading Instructional Level** — The level at which the student knows 85 to 90 percent of the words and therefore reads easily enough to gradually acquire new vocabulary and associated skills.
- + **Word Reading Frustration Level** — The level at which the student is unable to read so many of the words that he or she misses the essence of passages and finds the task of reading uncomfortable or unpleasant.
- + **Comprehension of Passages** — The level at which the student is able to understand and remember the facts and subtleties of passages. (Both reading and listening comprehension may be tested.)

At the end of each school year, facilitators can submit their students’ DST:R pre- and post-test scores to CEI for statistical analysis. Via a secure online connection, CEI offers a detailed, graphic summary of student progress to school and district administrators. CEI also studies these results to evaluate the effectiveness of the ELS program.

The following study includes a total of 4,334 elementary students with learning disabilities. After working on the ELS program for one school year, these students gained an average of 1.6 grade levels in reading comprehension! Twenty-eight percent of the students had an average increase of two or more years.



**ELEMENTARY STUDENTS**

4,334 students

Average Gain: 1.6 grade levels

28% of students gained 2 or more grade levels!

These results are even more dramatic than those found in the study, proving again that ELS is effective at accelerating the achievement of students with learning challenges.