The Logic of English
and the Science of Reading

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Introduction

The goal of reading instruction is to give students the ability to read, comprehend, and learn from texts. Developing strong readers requires providing them with a deep foundation of knowledge about words which they can then access to make meaning.

Reading research has led to an understanding of how the brain reads and the types of instruction that develop strong and proficient readers. Repeatedly, research has demonstrated that effective instruction explicitly teaches the following subskills:

- **Phonemic awareness**
- **The Alphabetic Principle and systematic phonics**
- **Fluency and high frequency words**
- **Vocabulary development**
- **Handwriting and spelling**
- **Reading comprehension** (NICAD, 2000; Moats, 1998)

Research has also demonstrated the benefits of a holistic, multi-sensory approach where students are taught language by ear (speech perception), by mouth (speech production), by eye (reading), and by hand (writing) (Berninger, 2012).

When the skills of reading are taught systematically in a manner that utilizes all the learning modes – speaking, seeing, hearing, writing – almost all students are able to learn to read and comprehend (McGuinness, 2005).

Logic of English®

The Logic of English® series of books and curriculum is based upon leading research about reading, multi-sensory education, and linguistics.

All Logic of English curriculum includes explicit instruction in:

- **Phonemic awareness**
- **The Alphabetic Principle and systematic phonics**
- **Fluency and high frequency words**
- **Vocabulary**
- **Handwriting and Spelling**
- **Reading comprehension**

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Phonemic Awareness

The first stage of written language development is phonemic awareness, which is the ability to examine and manipulate the phonemes, or sounds, of the language apart from meaning (Cunningham, 1988). The English language includes forty-four phonemes which are encoded using the twenty-six letters of the alphabet (Adams, 1990).

"Phonemic awareness is one of the most important causal factors separating non-impaired and impaired readers.**"** Phonemic awareness is the most basic skill of reading and writing (Griffith & Olson, 1992) and is a precursor to phonics instruction (Juel, Griffith, & Gough, 1986). Phonemic awareness is one of the most important causal factors separating non-impaired and impaired readers (Share & Stanovich, 1995). It also correlates more highly with reading acquisition than tests of general intelligence or reading readiness (Stanovich, 1986; 1993), and is vitally important in learning to spell and write (Ehri & Wilce, 1987; Stanovich, Cunningham, and Cramer, 1984; Nation and Hulme, 1997).

Phonemic awareness should be developed in students by manipulating and identifying phonemes, and using exercises such as:

- **Phonemic Blending** – the student combines */t/ /o/ /p/* to make the word *top*.
- **Phonemic Segmentation** – the student separates *tap* into */t/ /a/ /p/*.
- **Phonemic Isolation** – the student says the first sound in a word, such as */d/* in *dog*.
- **Phonemic Identity** – the student identifies the sound that is the same in words such as: *tall, top,* and *tuck* (Ehri et al, 2001).

Since isolated phonemes are not naturally discovered by many students, a true mental revolution will have to take place before the child finds out that speech can be broken down into phonemes, and that the sound */ba/* is made up of two phonemes */b/* and */a/* (Dehaene, 2009). Students make this discovery by being shown how sounds are produced by forming the mouth into various positions and turning on and off the voicebox (McGuinness, 2005). The ability to isolate and analyze phonemes is crucial to the student understanding the purpose of the alphabet (McGuinness, 2004).

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Students beginning Logic of English instruction develop a strong foundation in phonemic awareness by:

- **Discovering how sounds are produced in the mouth**
- **Playing games to manipulate the initial, final and medial sounds**
- **Listening for sounds that are alike**
- **Auditorily blending sounds into words**
- **Learning to segment words into sounds**
- **Practicing rhyming**

Students' stages of development are respected as they are led from simple to more complex phonological tasks. Instruction begins with exploring how the mouth is positioned to form sounds and learning to distinguish sounds. Students then progress to blending sounds into one-syllable words and learning to segment short words into their individual sounds. As students grow in phonemic awareness, they are explicitly taught how to identify initial, medial, and final sounds as well as how to rhyme. Students are also provided with explicit practice in blending and segmenting multi-syllable words which prepares them for reading and spelling.

The Logic of English develops phonological skills through fun, age-appropriate games and activities.

When students are explicitly taught phonemic awareness, they begin to develop the phonological processing pathways in the brain which sound out words (Dehaene, 2009). When the knowledge of the phonemes is combined with the corresponding phonograms and the rules that govern their usage, students are given access to a phonemic code that facilitates the storage of speech sounds in memory (Dehaene, 2009).

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The Alphabetic Principle and Systematic Phonics

The second stage of written language development is learning the connection between the phonemes and the letters that encode them. Understanding the relationship of speech to print is the second critical factor in determining reading success (Fletcher & Lyon, 1998).

The understanding that sounds are anchored to letters or strings of letters is known as the Alphabetic Principle (Moats & Snow, 2005). The Alphabetic Principle is an abstract concept which is best taught explicitly to students in order to provide clarity about what the symbols on the page represent in their most elemental forms.

"Understanding the relationship of speech to print is the second critical factor in determining reading success."

Phonics uses the Alphabetic Principle and phonemic awareness to teach students the relationship between the sounds and symbols. The symbols that represent sounds are called phonograms. Phonograms may be written with one, two, three, or four letters. In English, each phonogram may represent one to six sounds.

For emerging readers, knowing the sounds of the phonograms is more important than knowing the letter names. In fact, knowledge of letter names may even delay the acquisition of reading (Dehaene, 2009) for some students. To know that an *S* is named */ess/*, a *K* /*kay*/, or an *I* /*eye*/ is useless when we try to read the word *ski*. Letter names cannot be assembled during reading; rather, it is the sounds of the phonograms that are blended together into words (Dehaene, 2009). Therefore it is no surprise that knowing letter-sound correspondences is a much stronger predictor of reading success than knowing letter names (Stuart, 1995; McGuinness, 2005).

Phonics instruction should provide explicit lessons in the Alphabetic Principle (Adams, 1990) and teach students to associate each sound with its corresponding spellings (Moats, 1998). In this manner students will learn to recognize and decode words using the sound-symbol correspondence, a strategy that all good readers demonstrate (Ehri, 1991).

Logic of English

The Logic of English teaches the Alphabetic Principle and systematic phonics through engaging and explicit teaching of the:

- **74 phonograms**
- **30 spelling rules**

Through explicit instruction of the seventy-four phonograms, Logic of English students establish a clear understanding of how the combinations of letters on the page represent the sounds of English and gain a deep understanding of the Alphabetic Principle. Logic of English students learn that the most elemental form of the written code represents sounds.

Instruction begins by teaching the sounds of the twenty-six single-letter phonograms (a-z) while de-emphasizing the names at the early stages of instruction. This provides students with the information most critical to learning to read and spell.

The introduction of phonograms has been ordered so that students learn the most commonly used phonograms first in order to efficiently acquire the knowledge needed to read real books as soon as possible.

Students develop mastery of the phonograms through fun multi-sensory games which develop a strong memory link between the sounds and their corresponding written symbols.

Research demonstrates that it is necessary to first teach common sound-symbol correspondences and then less common ones step-by-step. These sound-symbol units are then able to be read and spelled into words (Moats, 1998; Ehri et al., 2001). The English language has 44 sounds and only 26 letters to represent them resulting in an opaque orthography. Therefore students need to be taught more complex units which correspond to phonemes (Dehaene, 2009), an example being *ough* as well as the sounds for A-Z. The human brain develops neurological pathways for this information by encoding spelling units as large as four letters which map onto speech sounds (Dehaene, 2009).

In addition to being taught the sounds that each phonogram makes, students should be taught the rules governing where a phonogram may be used within a word and what sound it will make in different word positions. With explicit instruction in these rules, students are able to understand letter patterns and reach fluency more easily (Diggory, 1992).

As students progress in phonemic awareness and the alphabetic principle, they should be explicitly taught how to decode words (Adams, 1990 from Moats, 1998). Researchers have repeatedly demonstrated that readers who read fluently are able to map phonograms to their sounds automatically. The process occurs so quickly it appears they are reading "by sight" (Ehri & Snowling, 2004).

An explicit understanding of how each phoneme is encoded is vital to retrieving the pronunciation of an unknown printed word and to spelling (Moats, 1999). This is expressly shown in the research related to dyslexic readers. Impaired, or dyslexic readers, suffer from poor phonemic awareness skills and faulty sound-symbol correspondence (Dehaene, 2009). Compared to non-impaired readers, dyslexic brains show less activity in the anterior and posterior reading systems located on the left side of the brain, and more activity in right hemisphere sites. The right side activity is thought to be attempting to compensate for the disrupted left side systems (Shaywitz et al., 2002).

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As students grow in the Alphabetic Principle and their knowledge of phonograms, they are then systematically taught to blend phonograms into words. Blending practice begins as soon as students have acquired the phonograms needed to create one-syllable consonant-vowel-consonant words. In this manner the students develop an understanding that the purpose of learning phonograms is to be able to decode words.

As students advance, they systematically learn how to read and spell:

- **Long vowel words**
- **Words with multi-letter phonograms**
- **Words described by the spelling rules such as: silent final E words, single vowel Y words…**
- **Multi-syllable words**

Students are taught the spelling rules through discovery-based activities which encourage critical thinking and engage students in becoming better language learners. Concepts are practiced through games and creative learning activities to develop mastery of these vital skills.

After a phonemically based reading intervention, impaired readers showed marked improvement in their reading skills and developed the neural systems for reading in both the anterior and posterior right hemisphere (B.A. Shaywitz et al., 2004). Also with intervention and development of the left hemisphere systems for reading, the right sided compensatory systems were no longer necessary (B.A. Shawywitz et al., 2004). In other words, students who received instruction about the phonemes and how the phonemes are used to form words not only become stronger readers but develop pathways in the brain that are consistent with strong reading skills.

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Logic of English teaches the true linguistic structure of English, so at no point are students left to guess or make large leaps in knowledge. Rather students are taught phonetic rules that eliminate exceptions and describe 98% of English words.

By incorporating the latests linguistics research, Logic of English helps students develop critical thinking skills about language and minimize rote memory of sight words.

For example, Logic of English teaches nine reasons for a silent final E, whereas most phonics programs teach only one reason. While knowing the rule, *the vowel sound changes because of the E*, is important, this rule accounts for only fifty percent of silent final E words, leaving the rest as exceptions. By teaching simple rules such as, *English words do not end in V; therefore add an E* (*have, mauve, comprehensive*), thousands of words are explained and students become stronger readers and spellers.

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Fluency and High Frequency Words

The third step leading to comprehension is to develop fluency. Fluency is one of the key gateways leading to making meaning from texts (Rasinski, 2009). Though the importance of fluency is widely grasped, how to achieve fluency is arguably one of the most misunderstood subjects of reading pedagogy. Nevertheless recent research has increasingly made clear the process by which students become fluent readers.

A fluent reader reads automatically with appropriate and meaningful expression (Rasinski, 2009). No conscious attention is diverted from the thoughts underlying the text (Rasinski, 2009) and students are therefore able to focus on the higher order processes of comprehending during reading (La Berge & Samuels, 1974) and composing content during writing (Scardamalia, 1981).

In addition, fluent readers use prosodic cues to access a written text like a spoken text (Allington, 1983 from Schreiber, 1980). These cues – phrases, emphasized words, dramatic pauses, when the voice is raised and lowered, or when the pace is quickened or slowed – are detected by the speech areas of the brain, and further enhance the readers' understanding of the text (Rasinski, 2009).

Fluency in reading is a vital step for reading comprehension; however, reading instruction should not begin with fluency practice. The prerequisite capabilities to begin developing fluency are:

- **Letter familiarity**
- **Phonemic awareness**
- **Knowledge of sound-symbol correspondence (Ehri, 1998).**

These skills allow students to see connections between how the words are spelled and how they are pronounced (Ehri, 1992; 1998). Students use this knowledge to decode words. Once students are able to decode, they must repeatedly practice decoding so that it becomes automatic (La Berge & Samuels,

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Logic of English curriculum has a comprehensive approach to developing fluency. Instruction begins with:

- **A linguistically accurate phonetic system**
- **Interwoven instruction on morphology**
- **Explicit instruction on how words are read and spelled**
- **An emphasis on mastering high frequency words**

Logic of English lessons explicitly teach the rules and phonograms that describe 98% of English words. As students learn each concept, they practice applying it to reading and spelling a variety of words that represent the pattern. In this manner, students gain mastery of the concept and begin to develop fluency and strategies needed for approaching new words within texts.

The rules and phonograms are then applied to high frequency words. Rather than drilling these words as exception words that must be memorized by rote, Logic of English students learn why every high frequency word is spelled in a particular manner and how to decode it. Students then practice the high frequency words through engaging games and activities so that they develop fluency and automaticity.

1974) or instantaneous. Many teachers refer to this ability to read a word instantaneously as reading by sight. An important property of sight word reading is that words are unitized which means they are read as single units with no pauses between word parts (Ehri, 2005). Sight words are known so well that readers recognize their pronunciations and meanings automatically without seeming to sound them out (LaBerge & Samuels, 1974).

Fluency is best developed through a combination of mastering systematic phonics, practicing high frequency words, and repeated readings (Moats 1998, LeBerge & Samuels, Rasinski, 2009).

Readers who read by sight form connections between letters in spellings and sounds in pronunciations of the words (Ehri, 1995, 1998). These connections are formed out of the readers' knowledge of the alphabetic system. This includes knowledge of sound-symbol correspondence, phonemic awareness, and an understanding of spelling patterns that re-occur in different words (Ehri, 2005). Numerous fMRI studies have demonstrated that fluent readers are using Broca's area and the planum temporale area of the brain to access the written word (Dehaene, 2009). This area of the brain is the same one that is used for speaking and listening (Dehaene, 2009). Fluent readers, therefore, are hearing the text in their brain (Dehaene, 2009) and making sound-symbol correspondences (Ehri, 2005). The process is so fast that it appears that they are reading whole words, when in fact they are converting the letters on the page into sounds. The brain then recognizes the groups of sounds as words (Myers, 2008).

As students master phonics it is beneficial to use the skills to practice the 300 high frequency words which make up 65% of all texts (Fry, 2002). When readers learn a high frequency word, they should begin by looking at the spelling, pronouncing the word, then distinguishing the separate phonemes in the pronunciation, and recognizing how the graphemes match up to phonemes in that word. Reading the word several times will then secure its connection in memory (Ehri, 2005). Students should not be required to guess at the word or memorize the word by rote (Moats 1998).

A common method for helping students to develop fluency is repeated readings. With this method students read and reread a text, orally practicing prosodic cues and working on mastering the words within the text. Repeated reading strategies have well-documented evidence of improving fluency and word recognition as well as enhancing comprehension (Blum & Koskinen, 1982; Chomsky, 1976; Herman, 1985; O'Shea, Sindelar, & O'Shea, 1985; Samuels, 1979; Taylor, Wade, & Yekovich, 1985).

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Logic of English lessons all include carefully chosen spelling lists that are taught through a unique method called spelling dictation. In this method, students are taught how to analyze the spelling of every word; therefore, they develop a clear mapping of the phonemes to the graphemes.

In these lists students will never encounter a rule or a phonogram that has not been explicitly taught. However, once a concept has been introduced it is now "fair play" and may appear at any time within the list. In this manner students encounter words and must apply the linguistic tools they have learned to spelling, further developing mastery of the code.

These lists place a high emphasis on high frequency words, further developing the students' fluency.

In addition Logic of English lessons include a wide variety of activities to ensure that students develop fluency, including:

- **High frequency word games**
- **Repeated readings**
- **Take home readers**
- **Reading activities that target specific linguistic skills**

Students have repeated exposure to high frequency words and targeted linguistic skills in a wide variety of engaging reading games, puzzles, stories, and texts facilitating mastery.

One of the greatest misconceptions about how to achieve fluency is the belief that sight word reading is an initial strategy for learning how to read (Ehri, 2005). In this method teachers show students a word and ask the student to read it without sounding it out. These teachers mistakenly believe that students must be able to recognize the whole word, apart from its individual phonemes, as a step in developing fluency. This, however, limits the strategies that a student can apply to reading and asks them to rely on visual memory alone. In contrast, strategic readers will figure out unknown words by decoding, analogizing, or predicting (Ehri, 2005).

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Oral fluency practice is woven into the lessons beginning with words, then phrases, then sentences, followed by short paragraphs, and finally books. Activities respect the child's growing capabilities and provide a clear path to becoming fluent.

A second false assumption is that many high frequency words – such as, *the*, *through*, *and*, *at*, and *to* – are exceptions to the rules of English spelling. Yet reading high frequency words automatically is necessary to fully comprehending a text (Pikulski & Chard, 2005). This presents a dilemma for teachers who understand the importance of teaching phonics but also find that the most common words are all exceptions to the rules and therefore must be memorized by rote or by sight. However when teachers are presented with a linguistically more accurate understanding of the language, using phonograms and spelling rules, and know how to use morphology to provide logical explanations for words that appear to not follow the rules, this problem is resolved. Additionally, when students are explicitly taught the regularities that are within high frequency words, they gain instant recognition (Ehri 1995, 1998) more quickly and with fewer repetitions of the word (Reitsma, 1983; Share, 2004) and learn the patterns necessary to reading other words fluently. The key challenge in reading education at this point in time is teaching educators a linguistically sound understanding of English.

A third misunderstanding is that fluency is gained by mastering only the high frequency or irregularly spelled words by sight. However, students must be able to instantly recognize far more than the high frequency words to be fluent. Instant recognition of a large number of words depends upon the student developing knowledge of sound to symbol correspondences. If readers do not know various spellings for a long vowel sound, or if they do not know that *ph* symbolizes */f/*, then when they encounter these letters in particular words, the letters will not become bonded to their phonemes in memory (Ehri, 2005), and the student will struggle to read the word fluently. Knowledge of sound-symbol correspondence must be learned and practiced for bonding to occur (Ehri, 2005) which will then aid students in fluently reading even words that have not been previously seen.

In summary, readers learn to process spellings of words as phonemic maps that lay out elements of their pronunciations visually. Fluent readers have become skilled at computing these relations almost instantaneously when they read. It is knowing the sound-symbol correspondence that bonds letters in written words to their pronunciations in memory, along with meanings. Once alphabetic mapping is learned, readers can build a vocabulary of sight words easily and efficiently (Ehri, 2005).

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Vocabulary Development

While reading is a key path to developing a large vocabulary, large vocabularies are also a key to reading comprehension. The most efficient manner to developing vocabulary is to understand that every word in English is comprised of both *phonemes*, units of sounds, and *morphemes*, units of meaning.

When students learn the phonograms combined with morphemes, they develop two paths in the brain to ascertain meaning; the phonological path and the lexical path. The lexical areas of the brain (the middle temporal lobe) are where words are understood if the word's pronunciation does not reflect its exact spelling, and also where the brain stores the meaning of prefixes, base words, and suffixes (Dehaene, 2009; Diggory, 1992).

In strong readers the brain uses two pathways to derive meaning: the lexical and the phonological routes (Dehaene, 2009.) When students are provided explicit instructed in the morphemes of words, they are then able to use this information to parse a word using the lexical encoding as well as the phonemic encoding leading to deeper comprehension of a text.

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Logic of English instruction explicitly teaches the concept of morphemes, which provides students with an understanding that all words are written with units of meaning. Morphemes provide students with additional strategies for decoding, spelling, and developing a large vocabulary. Logic of English lessons utilize morphology to aid students in reading and spelling:

- **Irregular words**
- **Multi-syllable words**
- **Words with affixes**

By teaching morphemes, often the reason for the spellings of words which do not follow the phonics rules becomes clearer. For example though we cannot hear the W in *two*, it is plainly heard in the related words: *twin, twice, twelve.*

Morphology also helps students to learn the meaning of "big words." Since 90% of multi-syllable words are based upon Latin roots, knowledge of roots provides students with an additional strategy for making meaning of an unknown word.

In addition Logic of English students are explicitly taught how to add prefixes and suffixes, and what they mean. This knowledge again provides critical clues about a word's meaning.

Handwriting and Spelling

One of the most beneficial ways to improve fluency is to intertwine reading and spelling instruction as related subjects. The most effective spelling practice will include writing the words by hand.

Reading and spelling are both processes of the Alphabetic Principle. Reading is how students decode fluent speech from print, while spelling is how students encode spoken words into written words. When the relationship between spelling and reading is shown, students gain a better understanding of the code and demonstrate gains in reading comprehension (Moats, 2005), vocabulary (Moats, 2005), fluency (Snow et al., 2005), spelling (Berninger, 2012) and composition skills (Moats, 2005; Peverly, 2012).

Spelling instruction begins by learning how to write each of the phonograms beginning with the twenty-six letters of the alphabet. Research has demonstrated that students' ability to write the letters is closely interwoven with their ability to read words (Domico, 1993; Richgels, 1995).

Good handwriting instruction develops automatic muscle memory, meaning the students can write quickly and legibly with little conscious attention (Berninger & Rutberg, 1992). A process is automatic if it occurs without voluntary control and interferes minimally with other processes (Pashler, 1994). When students have developed automatic handwriting, they are then free to concentrate on spelling, higher-level thought, and written expression (Sheffield, 1996; Handley-More et al., 2003). In addition, students retrieve the letters from memory more easily (Case-Smith, 2012; Berninger, 2012).

Handwriting also builds recognition of words using kinesthetic memory – the earliest, strongest, and most reliable memory channel (Sheffield, 1996). Scientists at Johns Hopkins University showed that practicing handwriting changed which brain regions were being activated and demonstrated that these changes resulted in almost immediate improvements in reading fluency and the development of the neural pathways needed for reading. In the experiment, subjects' brains engaged new regions to perform the handwriting, with a shift from the prefrontal regions to premotor, posterior parietal, and cerebellar cortex structures. This shift is specific to recall of an established motor skill and increased stability of the skill (Holcomb & Shadmehr, 1997). Through fMRI brain studies, it has also been shown that the sequential finger movements used in handwriting activate massive regions of the brain involved in thinking, language, and working memory (James, K.H., 2012).

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Logic of English students learn to read and write simultaneously as part of a well developed multi-sensory approach to literacy. Students progress systematically through the following steps of learning to write and spell:

- **Lowercase single-letter phonograms (a-z)**
- **Short words**
- **Short phrases**
- **Uppercase single letter phonograms (A-Z)**
- **Multi-letter phonograms (ch, oy, ow)**
- **Sentences**
- **Multi-syllable words**

Students are taught how to write each phonogram as they are introduced to its visual representation and sounds. Handwriting instruction begins using large-motor movements and emphasizes the rhythm of each movement in order to develop automatic muscle memory. In this manner students learn to associate the printed shape, how it is formed through writing, and its sounds. As students acquire the needed fine motor skills they then progress to writing on paper.

Other studies have confirmed that when written production is less practiced, it interferes with conscious retrieval processes during reading (Bourdin, 1999; Bourdin & Fayol, 1994, 1996, 2002). This is because a motor experience, such as writing, changes our neural activation patterns when we next perceive the object visually. Now, simply looking at the object activates the motor system (Chao & Martin, 2000; Grezes & Decety, 2002; James & Atwood, 2008). This has recently been found to occur when we view letters as well (James & Gauthier, 2006), suggesting that our history of interacting with letters through writing is stored and perhaps re-activated upon visual presentation.

As a result students should frequently practice spelling by writing as opposed to typing. Compared to typing, handwriting requires executing finger strokes to form a letter, whereas keyboarding only involves touching a key (Berninger et al., 1998).

Despite a cultural tendency to deemphasize handwriting and spelling instruction, it is vitally important that all reading curriculum integrate spelling and handwriting as part of a multi-sensory approach to mastering the written form of language.

Logic of English

As students master phonograms, they learn to combine them to spell short words, then progressively larger and more difficult words. By teaching students to spell, they develop a clear understanding of the relationship between speech and print.

Each new phonogram and spelling rule is taught explicitly before it is used for spelling or reading. Games and activities help students apply the knowledge to a wide variety of words.

Spelling lists may use any rule or phonogram that has been previously taught - thus requiring students to use critical thinking skills during spelling. New spelling words are introduced using a multi-sensory method called spelling dictation. In this process students write the word and analyze the phonograms and rules that explain its spelling thereby developing a clear mapping of sounds to symbols.

As lessons progress a wide variety of phrase, sentence, and paragraph level writing activities continue to engage the motor learning of students and aid them in becoming stronger writers as well as readers.

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Reading Comprehension

The end goal of all reading instruction is that students would be able to read and comprehend a text. When students comprehend, they are developing models of meaning from the information within a passage (Duke & Pearson, 2002) and are able to combine this information with their prior knowledge to refine their models of understanding and formulate new models (Pearson et al., 1992; Gordon & Pearson, 1983; Hansen, 1981). As readers encounter new information, their knowledge base expands (Anderson & Freebody, 1981) and forms the foundation upon which the student is able to further construct meaning. Yet as we have seen however, comprehension rests upon the student mastering the underlying skills of reading.

Without phonemic awareness, students will be unable to develop strong decoding skills (Moats, 1998) which aid students in recognizing words (Snow et al., 1998). Decoding must be developed to the point of automaticity so that students are able to focus their attention on higher order processing (Sousa, 2006; Tan & Nicholson, 1997). Explicit vocabulary instruction then helps students to develop strong word knowledge which in turn enhances comprehension of increasingly complex texts (Anderson & Freebody, 1991; Nagy et al., 1987; Becket al., 1982; Beck & McKeown, 1991; Durso & Coggins, 1991).

Once a student knows how to decode and can read high frequency words and common linguistic patterns with automaticity, the difficulty of a given text is determined based upon the difficulty of the vocabulary and the prior knowledge needed to read the text (Anderson & Freebody, 1981). Therefore, even a highly accomplished reader may struggle to access the information in a given text. For example, a reader who is able to easily comprehend a complex legal document may struggle to read and comprehend an advanced textbook on quantum physics. The issue is not that the reader lacks the necessary reading skills but that the reader lacks the prior knowledge and the understanding of physics vocabulary terms necessary to comprehend the information.

Students should explicitly be taught how to access prior knowledge and integrate it with their reading of a text, as well as how to use prior knowledge to form inferences (Hansen & Pearson, 1983). One particularly effective method is to ask students why particular facts are being presented and actions taken (Pressley et al., 1992). It is also beneficial to encourage students to elaborate on what they have read (Pressley et al., 1992). This process not only has been shown to increase student comprehension but to also increase the

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Logic of English methodically develops reading comprehension skills by introducing students to high-quality information-rich books which require students to read and comprehend from the earliest stages.

In the early lessons students begin by reading simple Readers which initially do not include illustrations. The students then cut out the pictures and glue them to the page with the appropriate text. This completes the reader, and gives students a way to demonstrate early comprehension skills in addition to helping students solidify early decoding skills without guessing.

The readers then transition to include engaging stories. These are followed by high-quality information-rich readers which introduce the student to new topics and information. No one would suspect these as being controlled phonics readers, yet no phonemes or rules that have not been explicitly taught are included. Due to careful writing, students are able to successfully decode every book and focus on learning comprehension skills while continuing to develop their understanding of the English code.

retention of the material (Martin & Pressley, 1991). Students should be encouraged to read extensively from high-quality, information-rich texts (Stanovich & Cunningham, 1993) as a means of further developing their knowledge base.

As students read, they should be monitoring themselves. This means being aware of what they do understand, aware of what they don't understand, and choosing from a variety of comprehension strategies to bridge the gap (NICHD, 2001; Pressley, 2000). Monitoring reading requires that students be fluent decoders so that they are able to focus their attention on meaning and notice when a decoded word does not make sense and should be re-decoded (Anderson and Freebody, 1981). When students know the phoneme(s) that each phonogram or phonograms stands for, they will have access to the linguisitic tools necessary to make sense of the word.

As students master these underlying skills, they are ready to begin learning specific comprehension strategies that will aid them in pulling further meaning from the text. Explicit teaching which includes teachers telling readers why and when they should use strategies, what strategies to use, and how to apply them, helps students to further develop into effective readers (NICHD, 2001).

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By the time well-known children's books are introduced, the student has learned all the linguistic concepts needed to read the book without guessing and developed adequate fluency to focus their attention on higher-order thinking skills.

Throughout the lessons students are introduced to pre-reading, reading, and post-reading strategies to expand the tools they have to comprehend and learn from texts.

Comprehension research has uncovered a wide variety of strategies that are beneficial to developing further understanding of texts. Strategies can be loosely divided into pre-reading, during reading, and post reading strategies (Nagy, 1988).

Pre-reading activities should include:

- Know why they are reading a text (Anderson et al., 1987).
- Make predictions about what a text will be about based upon the title and prior knowledge (Anderson et al., 1987).
- Recall prior knowledge about a topic (Martin & Pressley, 1991) so that it is more readily accessed during reading.
- Introduce new vocabulary terms related to the topic (Pressley, 2000).
- Identify if there is a question that needs to be answered during reading (Raphael & Pearson, 1985).

During reading students must be taught how to use the following skills based upon the type of text they are reading:

- Figure out the meanings of unfamiliar vocabulary based on knowledge of phonology (Nagy, 1988), morphology (Nagy, 1988), and context clues (Pressley, 2000).
- Monitor their reading for meaning (Pressley, 2000).
- Reread sentences or passages to clarify or further develop the meaning (Allington, 1983; Dowhower, 1987).
- Underline key words and topic sentences (Pressley, 2000).
- Take notes (Gordon & Day, 1996).

- Paraphrase (Schumaker et al., 1984 from Parker et al., 2002).
- Use background knowledge to make inferences (Hansen and Pearson, 1983; Guszak, 1967).
- Generate questions about ideas in the text (Brown et al., 1981; Kintsch & Van Dijk, 1978; Andre & Anderson, 1979; Brown & Palincsar, 1985).
- Construct mental images representing ideas in the text (Brown et al., 1981; Kintsch & Van Dijk, 1978).
- Predict what will occur next (Anderson et al., 1987; Guszak, 1967).
- Note whether their prediction and expectations about text content are being met (Pressley, 2000).
- Analyze the setting (Pearson & Dole, 1987; Pearson & Fielding, 1991; Pressley, Johnson, Symons, McGoldrick, & Kurita, 1989).
- Identify main characters (Pearson & Dole, 1987; Pearson & Fielding, 1991; Pressley et al., 1989).
- Identify the problem, attempts at a resolution, and final solution (Pearson & Dole, 1987; Pearson & Fielding, 1991; Pressley et al., 1989).
- Think aloud (Silven & Vauras, 1992).

As students complete the reading of a text they should be explicitly instructed on how to:

- Review important points (Cordón & Day, 1996).
- Relocate information within a text (Guszak, 1967).
- Translate ideas, pictures, metaphors and symbolism into their own words (Guszak, 1967).
- Consider how ideas encountered in the text might be used in the future (Cordón & Day, 1996).
- Revise their prior knowledge (Pressley, 2000).
- Evaluate a text's quality and reliability (Cordón & Day, 1996).
- Summarize by selecting or composing a topic sentence that summarizes the reading, composing a word to replace a list of items, and composing a word to replace individual parts of an action (Brown et al., 1981; Kintsch & Van Dijk, 1978).

As students mature and begin to read larger numbers of texts they need to be taught how to:

- Sift through large units of text (Dole et al., 1991).
- Delete unnecessary material (Brown et al., 1981; Kintsch & Van Dijk, 1978).
- Delete redundant material (Brown et al., 1981; Kintsch & Van Dijk, 1978).
- Differentiate important from unimportant ideas, and then create a new coherent text that stands for the original (Dole et al., 1991).

As students learn particular strategies, it is beneficial for the teacher to describe the strategy and discuss when it is best used, model the strategy, use the strategy collaboratively, and provide opportunities for independent practice (Duke & Pearson, 2002). It is particularly beneficial for students to think aloud as part of their comprehension training (Silven & Vauras, 1992) which helps the students to better clarity their thoughts and the teacher to understand the process the student is using.

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