

# How Spelling Supports Reading

## *And Why It Is More Regular and Predictable Than You May Think*

By Louisa C. Moats

**M**uch about spelling is puzzling. Our society expects that any educated person can spell, yet literate adults commonly characterize themselves as poor spellers and make spelling mistakes. Many children have trouble spelling, but we do not know how many, or in relation to what standard, because state accountability assessments seldom include a direct measure of spelling competence. Few state standards specify what, exactly, a student at each grade level should be able to spell, and most subsume spelling under broad topics such as written composition and language proficiency. State writing tests may not even score children on spelling accuracy, as they prefer to lump it in with other “mechanical” skills in the scoring rubrics.

Nevertheless, research has shown that learning to spell and learning to read rely on much of the same underlying knowledge—such as the relationships between letters and sounds—and, not surprisingly, that spelling instruction can be designed to help children better understand that key knowledge, resulting in better reading (Ehri, 2000). Catherine Snow et al. (2005, p. 86) summarize the real importance of spelling for reading as follows: “Spelling and reading build and rely on the same mental representation of a word. Knowing the spelling of a word makes the representation of it sturdy and accessible for fluent reading.” In fact, Ehri and Snowling (2004) found that the ability to read words “by sight” (i.e. automatically) rests on the ability to map letters and letter combinations to sounds. Because words are not very visually distinctive (for example, *car, can, cane*), it is impossible for children to memorize more than a few dozen words unless they have developed insights

---

*Louisa C. Moats is advisor on literacy research and professional development for Sopris West Educational Services. She developed Language Essentials for Teachers of Reading and Spelling, a professional development program for teachers, and Spellography, a spelling curriculum for children in grades 4 through 6. She has written several books and reports, including the AFT’s Teaching Reading Is Rocket Science and Speech to Print: Language Essentials for Teachers. This is her fourth article for American Educator.*

into how letters and sounds correspond. Learning to spell requires instruction and gradual integration of information about print, speech sounds, and meaning—these, in turn, support memory for whole words, which is used in both spelling and sight reading.

Research also bears out a strong relationship between spelling and writing: Writers who must think too hard about how to spell use up valuable cognitive resources needed for higher level aspects of composition (Singer and Bashir, 2004). Even more than reading, writing is a mental juggling act that depends on automatic deployment of basic skills such as handwriting, spelling, grammar, and punctuation so that the writer can keep track of such concerns as topic, organization, word choice, and audience needs. Poor spellers may restrict what they write to words they can spell, with inevitable loss of verbal power, or they may lose track of their thoughts when they get stuck trying to spell a word.

But what about spell check? Since the advent of word processing and spell checkers, some educators have argued that spelling instruction is unnecessary. It’s true that spell checkers work reasonably well for those of us who can spell reasonably well—but rudimentary spelling skills are insufficient to use a spell checker. Spell checkers do not catch all errors. Students who are very poor spellers do not produce the close approximations of target words necessary for the spell checker to suggest the right word. In fact, one study (Montgomery, Karlan, and Coutinho, 2001) reported that spell checkers usually catch just 30 to 80 percent of misspellings overall (partly because they miss errors like *here* vs. *hear*), and that spell checkers identified the target word from the misspellings of students with learning disabilities only 53 percent of the time.

Clearly, the research base for claiming that spelling is important for *young* children is solid: Learning to spell enhances children’s reading and writing. But what about middle-school students? Does continued spelling instruction offer any added benefits? Here the research is sparse indeed. Yet, the nature of the English language’s spelling/writing system provides reason to believe that there would be significant benefits to older stu-

remedy  
medicine  
med  
the root med...

it must  
have  
something  
to do with  
*healing*

medicinal has



dents from allocating a small amount of time to continued, appropriate spelling instruction. In addition to continuing to learn the rules of spelling, students can develop a deep understanding of English by studying the meanings of roots, prefixes, and suffixes; families of related words; the historical development of the English language; and words' language of origin. It's very likely that this sort of word study (in addition to being intrinsically interesting to many students) would support vocabulary development and facilitate reading by enabling students to view any new word from the angles of sound, meaning, language of origin, and syntax. As a result, students would be more likely to be able to figure out the new word's meaning as well as how to spell it and how to use it with precision.

Those of us who can spell reasonably well take for granted the role that spelling plays in daily life. Filing alphabetically; looking up words in a phone book, dictionary, or thesaurus; recognizing the right choice from the possibilities presented by a spell checker; writing notes that others can read—and even playing parlor games—are all dependent on spelling. In a literate society, conventional spelling is expected and anything beyond a few small errors is equated with ignorance and incompetence. In fact, the National Commission on Writing for America's Families, Schools, and Colleges (2005) reported that 80 percent of the time an employment application is doomed if it is poorly written or poorly spelled.

Why does spelling appear on the one hand to be simple, something any reasonably intelligent person should be able to do, but on the other hand, cause so many students academic grief? How can spelling be taught so that it will support reading instruction as well as help students understand how the spelling system works and see the ways in which spelling is predictable? This article attempts to answer both of these questions by first exploring the nature of the English language's writing/spelling system and, second, by outlining the key content that students should master in kindergarten through seventh grade.

## I. Making Sense of the English Spelling System (It's Not as Irregular as You Think)

The spelling of words in English is more regular and pattern-based than commonly believed. According to Hanna, Hanna, Hodges, and Rudorf (1966), half of all English words can be spelled accurately on the basis of sound-symbol correspondences alone, meaning that the letters used to spell these words predictably represent their sound patterns (e.g., *back*, *clay*, *baby*). These patterns, though, are somewhat complex and must be learned (e.g., when to use "ck" as in *back* and when to use "k" as in *book*). Another 34 percent of English words

\*Typically, that error would occur in spelling a vowel sound; vowels have multiple alternative spelling and some are quite variable (e.g., these words all have a long u /ū/, sound: *use*, *few*, *beauty*).

†More current and sophisticated analyses of the sound-to-spelling system of English have shown that vowel spelling variation is much greater than consonant variation (Kelsler and Treiman, 2001).

‡Of course, the reliance on Greek continues today in science, mathematics, and philosophy; recently coined terms include synthesizer and cryptogram.

would only have one error if they were spelled on the basis of sound-symbol correspondences alone.\* That means that the spelling of 84 percent of words is mostly predictable. Many more words could be spelled correctly if other information was taken into account, such as word meaning and word origin. The authors estimated that only four percent of English words were truly irregular.† Thus, the spelling of almost any word can be explained if one or more of the following five principles of English spelling is taken into account:

- 1) Words' language of origin and history of use can explain their spelling.
- 2) Words' meaning and part of speech can determine their spelling.
- 3) Speech sounds are spelled with single letters and/or combinations of up to four letters.
- 4) The spelling of a given sound can vary according to its position within a word.
- 5) The spellings of some sounds are governed by established conventions of letter sequences and patterns.

Each principle is explained in broad strokes and illustrated with one or more examples over the next several pages. Together, the first two principles explain why English words are so complex—and why that complexity is well worth the frustration it causes for beginning spellers (and readers). The last three principles reveal the order behind the seeming chaos; for the most part, these three result from well-meaning attempts to bring regularity to the English language.

As you read about these principles, keep in mind that this part of the article is designed to help teachers better understand the nature and structure of the English spelling system. This is essential background knowledge for teachers of reading, spelling, and writing. As Snow et al. (2005, p. 87) explained, the rules for spelling are very complex, "so it is not surprising that many highly literate adults who use those rules correctly [and automatically] find it difficult to talk about them or answer questions about them. Teachers who have been



taught about phonics ... have typically received information about ... [spelling] as lists of rules about letter sequence constraints. Such lists are unmotivated, unappealing, and difficult to learn. Lists without a logical framework or set of principles must be learned by rote rather than reason.” By providing a logical framework, these five principles transform spelling from an arbitrary list of rules about how letters can and cannot be combined into a structured system. Section two of this article offers a way of breaking that system into key content for instruction in kindergarten through seventh grade.

### 1. Words’ language of origin and history of use can explain their spelling.

One of the main reasons that English seems so irregular is that we have lots of different spellings for the same sound. For example, the /k/ sound can be spelled with several different letters and letter combinations, such as *k* (*king*), *c* (*cat*), *ck* (*back*), *qu* (*queen*), and *ch* (*chorus*). Why is this? Modern English has been influenced by several core languages, primarily Anglo-Saxon, Norman French (a dialect of Old French used in medieval Normandy), Latin, and Greek. Because each of these languages contributed its own conventions for spelling speech sounds, syllables, and meaningful units of speech, the spelling of a word is often related to, and even explained by, its history and language of origin (Balmuth, 1992; Bryson, 1990; Henry, 2003; King, 2000; Sacks, 2003).

As illustrated in the timeline below, the story of the English language begins roughly 1,600 years ago with the decline of the Roman Empire. At its height, the Roman Empire stretched from Britain to North Africa to the Persian Gulf, but barbarian attackers forced the Empire to split apart and withdraw from its outposts. After the Romans left Britain in 450 A.D., Germanic tribes known as Jutes, Angles, and Saxons invaded, pushing the Celtic inhabitants (who had lived under Roman rule for 400 years) to the west. As Celtic and Latin words, roots, and pronunciations were absorbed into the invaders’ Low West German languages, Anglo-Saxon—or Old English—was born. The most common, frequent words of Modern English—like those

for animals, family members, numbers, common objects, emotions, and universal daily activities—are preserved from Anglo-Saxon. Some examples include *goat*, *wife*, *mother*, *one*, *house*, *love*, *cook*, and *walk*. Of the 100 words used most often in English, all can be traced to Anglo-Saxon origins.

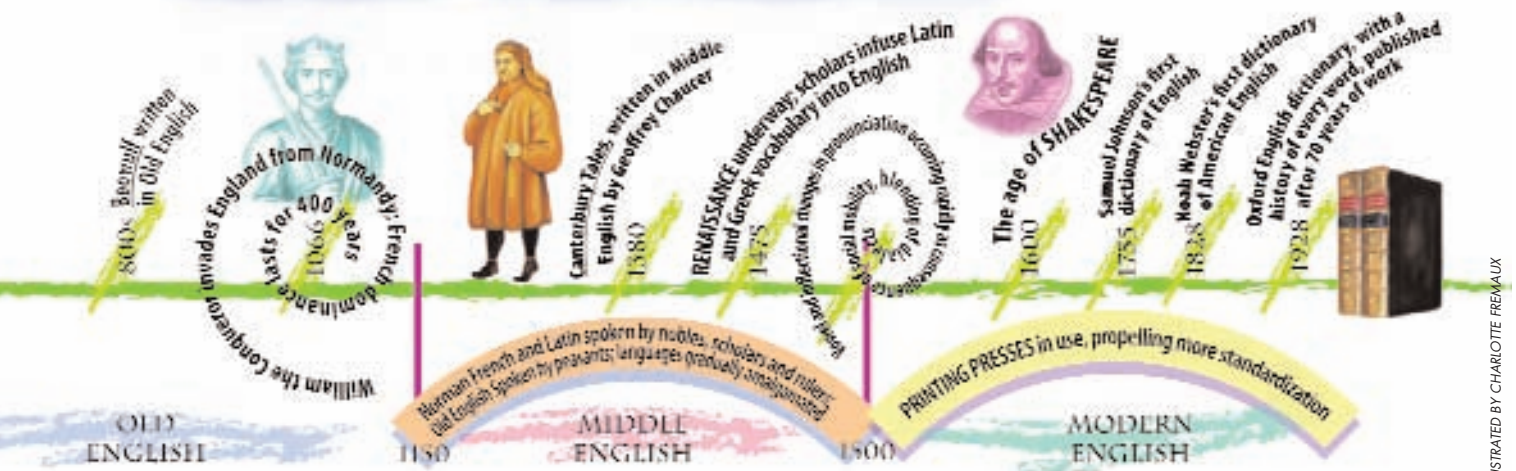
Famously in 1066, Britain was invaded by William the Conqueror from Normandy. As a result, the Norman French language was imposed on the British natives for almost 400 years. Norman French and Old English were gradually amalgamated, merging by the late 15th century into what is now known as Middle English. From Norman French we gained thousands of terms for legal concepts, social and moral ideals, and artistic values (such as *justice*, *peace*, *courageous*, *magnificent*, and *beauty*). Though the Normans spoke Norman French, their cultured class wrote in both their native tongue and Latin, languages that were closely related members of an Indo-European language family. Latin-based vocabulary became the language of scholarship, commerce, and official discourse (such as *solar*, *equine*, *residence*, *designate*, and *refer*).

During the Renaissance, which was a time of renewed interest in classical Roman and Greek culture and language, the growth of scientific disciplines created a need to name many discoveries. Scholars looked to Greek to coin new terms (such as *atmosphere*, *gravity*, and *chronology*).<sup>3</sup> At the same time, as printed material became more common in the late 1500s, scholars trained in the classics brought even more Latin-based words (such as *malevolent*, *fortitude*, *maternal*, *stadium*, and *calculus*) into English.

What did all this merging, layering, and borrowing mean for English’s spelling system? The short answer is that it became more complex: As explained below, the pronunciation of some of the oldest Anglo-Saxon words diverged from their spelling, and both Norman French and Greek contributed some new spellings.

Today, most of our regular sound-symbol correspondences come from the Anglo-Saxon layer of language (for example, almost all consonant spellings). Ironically, most of our irregular spellings come from Anglo-Saxon as well. Because the spelling

## TIMELINE OF THE ENGLISH LANGUAGE



ILLUSTRATED BY CHARLOTTE FREMAUX

of a word usually changes much more slowly than its pronunciation, some of our oldest and most common words (such as *said*, *does*, *friend*, and *enough*) have retained spellings that represent how they were pronounced eight or 10 centuries ago.

Norman French contributed additional sound-symbol correspondences, such as the soft *c* for /s/ as in *justice*, soft *g* for /j/ as in *courage*, *-ge* for /zh/ as in *garage*, *ou* as in *house* (which was *huse* in Old English), *qu* for /kw/ as in *queen* (which was *cwene* in Old English), *-que* for /k/ as in *boutique*, and *-ette* for /ët/ as in *baguette*. No new sound-symbol correspondences were contributed by Latin and only a few were adopted from Greek spelling patterns: *y* for /i/ as in *gym*, *ph* for /f/ as in *philosophy*, and *ch* for /k/ as in *chorus*.

During and after the Renaissance, however, English adopted words from many other languages—and their spellings were adopted as well (e.g., *barbecue*, *plaza*, *marijuana*, and *chocolate* from Spanish; *bayou*, *gauche*, *ballet*, and *levee* from French; *piano* and *cello* from Italian; *schmooze*, *schmaltz*, and *schlock* from Yiddish). For the most part, these adoptions added words to the English language, but unlike the earlier changes in which spelling patterns were adopted (e.g., from *cwene* to *queen*), they did not affect already established spelling patterns.

The many layers of the English language do make it harder to learn to spell, but they also provide a rich vocabulary: The English language has roughly double the number of words of seemingly comparable languages like German, Spanish, and French. As the lists below show, the layers of languages that merged to form modern English have left us with many words to express our ideas.

| Anglo-Saxon | Norman French | Latin                | Greek                    |
|-------------|---------------|----------------------|--------------------------|
| Water       |               | Aquifer,<br>aquarium | Hydraulic,<br>Hydroponic |
|             | Change        | Transform            | Metamorphose             |
| Sad         | Morose        | Depressed            | Catatonic                |
| Dead        | Deceased      | Moribund             |                          |

Fortunately, the way English evolved, and particularly the way scholars drew from Latin roots and Greek base words, resulted in many families of words with related meanings and similar spellings such that whole groups of words in Modern English can be learned together with relative ease. For example, as Latin was layered on top of Old English, Latin roots like *dict* (to speak) and *med* (to heal) resulted in families of words like these: *dictum*, *dictionary*, *edict*, *indict*; *medical*, *medicine*, *remedy*, *remedial*, etc. If you are reading carefully you may be about to protest: These families of words have related meanings and similar spellings, but sometimes their pronunciations are different. This brings us to the next principle.

## 2. Words' meaning and part of speech can determine their spelling.

English words are spelled according to both their sounds (phonemes, such as /b/) and their meaningful parts (morphemes, such as the root *dict*).\* In contrast, languages like

The many layers of the English language do make it harder to learn to spell, but they also provide a rich vocabulary.



Spanish and Finnish, for example, use single, consistent letters and letter combinations for sounds; they pretty much stick to the job of representing phonology. Once you know the sound-letter correspondences, you can read and write in Spanish or Finnish. That may sound great to a struggling speller, but it comes at a cost: If you encounter a new word, its spelling doesn't give you specific clues as to its meaning. In English, by contrast, if you know what to look for, you can find clues about an unknown word's meaning. The words *credible*, *credit*, *incredulous*, and *incredulity* offer an example—all four share a Latin morpheme *cred*, a root meaning "to believe" that is preserved in spelling. And the last two also share the morpheme *in*, meaning not. The spoken sounds of the words, however, differ considerably. A purely phonetic, sound-by-sound spelling of *incredulous* might be *increjulous*, but then the meaningful relationship between *credible* and *incredulous* would be obscured. With written English, readers who know the Latin morphemes *in* and *cred* may access word meaning directly. Meaning trumps pronunciation in the spelling of hundreds of English words. Here are some additional examples: *anxious*,

\*This is why linguists describe English spelling as a morphophonological alphabetic system.

# Spelling Instruction: Key Content and Strategies for Kindergarten through Seventh Grade





As explained in the main article (see p. 22), this brief overview of spelling instruction identifies key content to be emphasized in each grade. It is not, however, exhaustive as to the content that should be introduced or reviewed in each grade.

## Kindergarten:

### Phoneme awareness, letter sounds, and letter names.

Phoneme awareness training helps children in the early stages of learning to spell (Tangel and Blachman, 1995; Uhry and Shepherd, 1993) and helps remediate the problems of poor spellers at any age (Carreker, 2005). A typical activity for developing this skill is direct teaching of all consonant and vowel sounds, which, as you recall from the main article, is different from teaching the letters (Lindamood and Lindamood, 1998; Moats and Rosow, 2002). Other activities include identifying speech sounds (What sound do *you* and *unicorn* start with?), finding examples of words with a given phoneme (Which word ends with /t/, *hummed* or *pitched*?), or reversing the sequence of sounds in a word such as *safe* (*face*). In a “sound workout,” children may strengthen their phonemic awareness by placing a chip into a box for each speech sound in a word, saying each sound as the chip is moved, or stretching out a finger for each sound that is articulated.

“sting”

|   |   |   |   |
|---|---|---|---|
|  |  |  |  |
| /s/   | /t/   | /i/   | /ng/  |

As they are learning the letter sounds, children also need to learn the letter names. In kindergarten, fluency with letter names and forms facilitates spelling and is an indicator that children are

likely to develop oral reading fluency. Letters should be taught directly and systematically. Older poor spellers should be asked to write the alphabet in order, accurately, and quickly. (Allen 2005, describes multi-sensory techniques and activities in detail for students in the primary grades.)

## Grade 1:

### Anglo-Saxon regular consonant and vowel phoneme-grapheme correspondences.

Spelling by explicit phoneme-grapheme mapping (Berninger et al., 1998; Ehri, 1998; Grace, in press; Moats, 2004) requires the learner to match the letters/letter combinations in a word to the speech sounds they represent. One approach is to use a simple grid; each box of the grid represents a phoneme. As these examples show, the teacher selects a word and gives children an empty grid with a box for each phoneme. The teacher says the word, then the students repeat it, segment the sounds, and write a grapheme in each box.

*Straight:* In this example, the long *a* (/ā/) is spelled with the four-letter grapheme, *aigh*.

|   |   |   |      |   |
|---|---|---|------|---|
| s | t | r | aigh | t |
|---|---|---|------|---|

*Crash:* In this example, the *cr* combination stands for two phonemes; the *sh* is a digraph (meaning it represents one phoneme).

|   |   |   |    |
|---|---|---|----|
| c | r | a | sh |
|---|---|---|----|

Because it helps fix phoneme-grapheme correspondences in children’s minds, this technique supports children’s spelling, reading, and writing develop-

ment. It should be taught in first grade, but it is also especially helpful with second- and third-grade students who missed the fundamentals in the earlier grades.

## Grades 1-3:

### Irregular Anglo-Saxon words.

Because they are often very old words from Anglo-Saxon whose pronunciation—but not spelling—has changed, high frequency words are more often irregular than lower frequency words with a Latin or other romance-language base (e.g., French). Although instruction in irregular words needs to start early so that children don’t memorize the wrong spelling, it should not supersede instruction in the common phoneme-grapheme correspondences. Irregular words are learned most easily by students who already know common phoneme-grapheme correspondences and who can explicitly analyze the speech-to-print mapping system. This is because irregular words have some regular correspondences, and also because a good speller makes mental comparisons between what a spelling ought to be and what it is. Awareness of phoneme-grapheme correspondences, regular and irregular, is the “glue that holds the word in memory” (Ehri, 2004, p. 155).

Some suggested methods for teaching irregular words include: a) grouping words with some memorable similarity (e.g., the irregular spelling of *two* may be more memorable if it is grouped with the regular words *twin*, *twice*, and *twenty*; similarly, the irregular words *there* and *where* may be easier to remember if they are learned with the regular word *here*; lastly, some irregular words can be paired on the basis of spelling, pronunciation, and a more indirect connection, as in *their* and *heir*, both referring to posses-

sion); b) calling attention to the odd part of the word that must be learned by heart (*friend*; *does*); c) using a multisensory memory strategy (Carreker, 2005) that gives the students many ways to repeatedly practice spelling the word (such as copying the word while saying the letters, discussing what is odd about the word, and covering the word and then spelling it aloud); d) using mnemonics (there is a *rat* in *separate*; the *principal* is my *pal*); and e) asking the learner to pay very close attention to the letter sequence by visualizing it and recalling it backwards as well as forwards.

I suggest introducing irregular words at the rate of about three to five per week, beginning with words the children write most often (Moats, 2003) and also tend to misspell. If a child learns a basic high frequency word the wrong way, unlearning it once a habit has been formed is more difficult than learning it the right way the first time. Spellings for words such as *they*, *went*, *who*, and *said* should not be “invented” or they will be misspelled *ad infinitum*. If students are very poor spellers, concentrate instruction on words they are most likely to write (Graham, Harris, and Loynachan, 1994).

**Grade 2:**  
**More complex Anglo-Saxon spelling (spelling according to the position of a sound in a word, letter patterns/conventions, and most common inflectional endings).**

Guided discovery with word sorting and teacher questioning is a powerful approach for helping students understand spellings that depend on the position of a sound in a word (Bear, Invernizzi, Templeton, and Johnston, 2000) or established conventions (like *-ve*). For example, the *-ge* and *-dge* pattern for the phoneme /j/ lends itself to word sorting and guided discovery. Instead of telling students the pattern (i.e., when a single syllable word ends in /j/, spell it *-dge* right after a short vowel, and *-ge* right after a long vowel or other consonant), ask them to sort a list of words by the

spellings for /j/ and help them figure out what is going on. Once they see the pattern, they should be ready to learn the rule.

Inflections (*-ed*, *-s*, *-es*, *-ing*, *-er*, *-est*, which are also called grammatical suffixes) are morphemes that change the number, person, or tense of the word to which they are added, but they do not change its part of speech. The spelling errors in fourth- to sixth-grade students’ writings frequently concern inflections, especially *-ed* and plural *-s* and *-es* (Apel et al., 2004; Bryant et al., 1997; Moats, 1996). Although inflections are emphasized (and should be mastered) in third grade, they should be introduced in first grade and practiced for several years thereafter. I’ll use the suffix *-ed* to explain one teaching strategy. Begin by making students aware of the sounds the *-ed* suffix makes: /d/ as in *banged*; /t/ as in *snacked*; and /id/ as in *lifted*. Next, sort words according to the sound of the past tense ending and explain that only one of the endings (the *-ed* on *lifted*) makes a new syllable. The *-ed* spelling looks as if it spells a whole syllable, but most of the time it does not; thus, those endings are easy to ignore or to misspell. Then, the rules for adding endings must be tackled. There are three major rules in English for adding suffixes to base words: the doubling rule (*hopped*), the drop *-e* rule (*hoped*), and the change *y* to *i* rule (*studied*). These rules should be introduced one at a time, beginning in second grade, and practiced for several years until they are internalized. To teach them, start by decomposing familiar words with inflections by taking off the ending and finding the base word: hoping = *hope* + *ing*; studious = *study* + *ous*; committed = *commit* + *ed*. Then start combining base words and endings.

**Grade 3:**  
**Multisyllable words, including Anglo-Saxon syllabication, compounds, schwa, and most common prefixes and suffixes.**

Although children should begin practicing breaking words into syllables in first

grade, by third grade they should be ready to master syllabication. Children’s spelling should be greatly improved if they learn the six basic syllable types and how they affect spelling. For example, once children learn about the open,\* closed, and consonant *-le* syllable types, they can reliably predict when they should double consonants in words that end with a consonant *-le* syllable. When an open syllable is combined with a consonant *-le* syllable—as in *cable*, *bugle*, and *title*—there is no doubled consonant. In contrast, when a closed syllable is combined with a consonant *-le* syllable—as in *dabble*, *topple*, and *little*—a double consonant results.

To teach how to spell multisyllable words, consider beginning with compounds (*catfish*, *hotdog*, *playground*, and *yellowtail*). Compounds offer two big advantages: Children more easily detect their syllables, and the spelling of each base word stays the same.

Multisyllable words bring up the unavoidable problem of schwa (/ə/), the unaccented vowel sound that has been emptied of its identity and can be described as a lazy vowel. Teach children that some vowel sounds have the stuffing taken out of them when they are unaccented. After students spell a word such as *prob-lem*, *a-dept*, or *com-mit*, they can say the word naturally and mark the syllable that has a schwa. Instruction about schwa helps students understand why some words do not sound the way they are spelled—and reminds teachers not to rely exclusively on “spell it by sounding it out” because that strategy is limited with multisyllable words.

Having already learned the common inflectional endings, students should be ready to move on to other common Anglo-Saxon and Latin suffixes (such as *-en*, *-ly*, *-y*, *-ful*, *-less*, and *-ness*) as well as common Anglo-Saxon and Latin prefixes (such as *pre-*, *sub-*, *re-*, *mis-*, and *un-*). Children need to learn to recog-

\* Open syllables end with a long vowel sound that is spelled with a single vowel letter (as in *program*); closed syllables have a short vowel and end with a consonant (as in *hostel*).

**Spelling Concepts Super-Duper Construction**  
**Zone:** We have learned that Anglo-Saxon words are built by compounding. Sometimes, Latin and Anglo-Saxon word parts get crunched into compounds.

One of this week's spelling words—*superb*—comes from the Latin prefix *super-*, which means "over, above, in addition, or in fact." The *bi* in *superb* comes from the Latin *hug*, meaning "to be." *Superb* means "to be super"! *Superb!* (Note that the word is NOT *supper*.)

Because the word/prefix *super-* means "over, above, in addition, or in fact," it is similar in a group of words that are called **prepositions**. A **position** is a place, and the prefix *pre-* means "before." So, a **pre-position** is a word placed *before* something. Prepositions tell us where stuff is. *Over, under, by, in, and in fact* are all prepositions. There are a zillion Anglo-Saxon compound words built using prepositions (like *overdue*). Even though the prefix *super-* comes from the Latin language stream, there are also a zillion compound words built with *super-*. Are you a super-smart, super-cool, super-sweet superperson?

**Exercise 6**

Use a dictionary to find compound words that use the prepositions *over* and *under*, and the prefix *super-*. See how many words you can list in ten minutes.

**Example answers:**

| over-     | under-        | super-       |
|-----------|---------------|--------------|
| overcast  | understand    | supermarket  |
| overdue   | underdone     | superhuman   |
| overgrown | underline     | superhighway |
| overlook  | undertake     | supernatural |
| overcome  | undercut      | superstar    |
| overthrow | undertow      | superfine    |
| overwhelm | underhand     | supercharged |
| overtake  | underlog      | supervision  |
| oversp    | underestimate | superficial  |
| overboard | underbrush    | supercoole   |

©8      2004/03/03 • A Student Road Map to Better Spelling

the prepositions *over* and *under* appears on the left. Although the relationship between the meaningful parts of a word and the present-day meaning of a word range from transparent, as in *antebellum* (with *ante* meaning *before* and *bellum* meaning *war*), to obscure, as in *apartment* (with *a* meaning *to* or *toward* and *part* meaning *to share* or *part*), the stability of morpheme spellings assists with recall and recognition.

### Grades 5-6:

#### More complex Latin-based forms.

Content words (nouns, adjectives, adverbs, and verbs) in academic text are commonly of Latin origin and composed of prefixes, roots, and/or suffixes. Their study is productive for reading comprehension, spelling, and vocabulary development (Carlisle and Stone, 2005). However, more complex words or word parts derived from Latin often change either the pronunciation or spelling of the prefix and/or root. For example, *collaborate* is related to the root *labor* (to work). The prefix *col* is a changed form of *com* (*with*), designed to blend easily into the root. Many other "chameleon" prefixes operate this way. It's best to organize word study around a common root once prefixes and suffixes are recognized (Henry, 2003; Templeton et al., 1992).

### Grades 6-7:

#### Greek combining forms.

Since the Renaissance, scholars have drawn from the Greek language to name scientific concepts and discoveries. As a result, middle school (and older) students will encounter hundreds of words derived from Greek in math, science, and philosophy texts. Greek word parts work more like compounds than roots. They can be combined more flexibly, as follows: *thermodynamics* and *isotherm*; *psychobiology* and *neuropsychology*; *telephone* and *phonogram*. Their spellings are very consistent, and often use the correspondences *ch* for /k/, *y* for /j/ or /i/, and *ph* for /f/.

—L.M.

This exercise comes from *Spellography*, a program Louisa Moats developed with Bruce Rosow. *Spellography* teaches spelling explicitly and systematically, with concepts building on each other as children progress through the lessons. *Spellography* was designed for fourth- and fifth-graders, but it can also be used with older students in need of remediation. In addition to student workbooks, teacher resource and answer guides are also available. For more information, go to [www.sopriswest.com](http://www.sopriswest.com).

nize these prefixes and suffixes as stable and meaningful word parts and they should begin learning their meanings.

### Grade 4: Latin-based prefixes, suffixes, and roots.

Direct teaching about the meaningful parts of words begins with the most common inflections, but then extends to prefixes, suffixes, and roots of Latin origin (Henry, 2003). Prefixes and suf-

fixes have stable spellings and meanings. Suffixes such as *-ly*, *-al*, *-ment*, *-less*, *-ness*, *-ful*, *-ous* also signify the part of speech of the word to which they are added. Roots such as *nat* (to be born) can be studied through families of words, such as *natal*, *native*, *nation*, *national*, *multinational*, *international*, *nationalistic*, etc. This is especially helpful in grades four through eight to help students develop a larger vocabulary. A sample exercise on the prefix *super-* and



*anxiety; define, definition; heal, health; wild, wilderness; and rite, ritual.* The spelling of the morphemes is constant, but the pronunciation of the morphemes varies.

We've dealt with the two big sources of complexity in English spelling: the layering of various languages as English evolved and the emphasis on meaning instead of sounds. Now it's time to run through the three principles that make English spelling more predictable than you may think it is. These principles provide a framework for understanding those seemingly endless lists of rules that have given English spelling its bad reputation. We'll start with the most straightforward principle and then build up to some odd—but regular—spellings, such as beginning and ending /j/ sounds in *judge*.

### 3. Speech sounds are spelled with single letters and/or combinations of up to four letters.

These sound-symbol relationships are known to linguists as phoneme-grapheme correspondences. A phoneme is the smallest speech sound that distinguishes words. The words *beet*, *bit*, *bate*, *bet*, *bat*, *bite*, *but*, *bought*, *boat*, *boot*, and *bout* are all distinguished from one another by one phoneme—the vowel sound. A grapheme is a letter or letter combination that spells a phoneme. Graphemes may be composed of one to four letters, as in the following spellings for the /ā/ phoneme: *cradle*, *maybe*, *feign*, and *weigh*. Although many phonics programs and assessments speak of “letter-sound” correspondences, the mapping system between sounds and symbols in English is more accurately conceptualized the other way around—as a map between phonemes (sounds) and graphemes (the letters that spell those sounds).<sup>§</sup> In English, we have just 26 letters to work with—but we have about 40 phonemes (sounds) and more than 250 graphemes (ways to spell those sounds). The lists below provide some examples of the variety of graphemes that can be used to spell a single sound.

| Examples of Graphemes |                                   |                         |
|-----------------------|-----------------------------------|-------------------------|
| Speech Sound          | Examples                          | Graphemes               |
| /m/                   | mitt, comb, hymn                  | m, mb, mn               |
| /t/                   | tickle, mitt, sipped              | t, tt, ed               |
| /n/                   | nice, knight, gnat                | n, kn, gn               |
| /aw/                  | saw, pause, call, bought          | aw, au, a, ough         |
| /ū/                   | moo, tube, blue, chew, suit, soup | oo, u_e, ue, ew, ui, ou |

The idea of learning 250 graphemes may seem overwhelming at first, but spreading instruction across several grades makes the task manageable for teachers and students. Most can be learned through direct instruction and practice; some are learned more opportunistically, such as the various spellings for the vowel sound /ū/: *ue, ui, ew, u, oo*.

Since the speech sounds in English can be spelled so many ways, how do we know when to use a particular spelling? For those of us who cannot just “absorb” the right spelling as we read, some memorization of spelling rules is helpful, but

mainly we need to practice recognizing and writing groups of words that share a given pattern. “Rules” are often predictable letter sequences that can be learned with a combination of pattern study and memorization. The next two principles provide a framework that makes the patterns a little easier to learn.

### 4. The spelling of a given sound can vary according to its position within a word.

Making sense of when to use which grapheme relies in part on the position of the sound in the word. Scribes and dictionary writers invented some of these conventions as our language absorbed new letters, sounds, and words from other languages. As an example, let's focus on the three graphemes most commonly used to spell the phoneme /k/: *c* (*cast*), *k* (*kitty*), and *-ck* (*rock*).<sup>\*\*</sup> The letter *c* represents /k/ most of the time: It is used in consonant blends (as in *clam*, *craft*, and *scroll*) and is usually used before the vowel letters *a*, *o*, and *u* (as in *catch*, *corncob*, and *cup*). The letter *k* can represent /k/ before any vowel, but it is almost always used before *e*, *i*, and *y* (as in *ketchup*, *kid*, and *kyack*); in these cases, the letter *k* is taking over for *c* because when *c* is followed by *e*, *i*, or *y*, it has its soft sound /s/ (as in *cent*, *city*, and *cycle*). The letters *ck* represent /k/ after a stressed short vowel (as in *nickel*) and at the end of one-syllable words (as in *back*, *rock*, *neck*, and *stuck*).

Not all consonant or vowel spellings are that complex, but the choice of grapheme for a given speech sound is often determined by the speech sound that precedes or follows it. Here's a less complicated example: When the sounds /f/, /l/, or /s/ directly follow a short vowel in one-syllable words, a doubled *f*, *l*, or *s* is used to spell the sound (as in *staff*, *will*, and *grass*). Even vowel spellings, which can seem terribly complicated because they tend to have many graphemes for their short and long sounds, often become more predictable when the position of the vowel sound is considered. For example, /ou/ can be spelled with *ou* or *ow*—it's just a matter of where the /ou/ sound appears. If it is at the beginning of a word, use *ou* (as in *out*). If it is in the middle of a word or syllable, *ou* is usually correct (as in *mouse* and *house*)—except when /ou/ is followed by only a single *n* or *l* (as in *brown* and *howl*). Lastly, if the /ou/ sound is that the end of a word or syllable, use *ow* (as in *cow*).

### 5. The spellings of some sounds are governed by established conventions of letter sequences and patterns.

When dictionaries were first written and disseminated, rules for spelling had to be standardized. Scholars like Samuel Johnson and Noah Webster worked to accommodate the norms of the day and give the language more regularity.

To illustrate this principle, we'll examine the spellings for /v/ and /j/. It was not until the 1800s that the letters *j* and *v* were fully welcomed into the English alphabet (Sacks, 2003).

<sup>§</sup>For more detail on the speech-to-print system, see Moats, 2000 or Moats, 2004.

<sup>\*\*</sup>All of these spellings (plus *-c* as in *tonic*) come from the Anglo-Saxon layer of the English language. Three additional spellings for /k/ were adopted as English evolved over the past thousand years: *-que* (*antique*) and *qu* (*quit*) from Norman French and *ch* (*chorus*) from Greek.

---

Since the speech sounds in English can be spelled so many ways, how do we know when to use a particular spelling?



---

By then, scribes and writers of dictionaries had determined that English words would not end with those letters because they were easy to visually confuse with *i* and *u*, respectively, the letters from which each was derived. Though it seems odd to us today, that is why the spelling *-ve* is always used when the phoneme /v/ ends an English word; the combination prevents a word from ending in plain *v*. Thus, words with short vowels ending in /v/ (*have, give, glove*) are “regular” from the standpoint of spelling conventions. Likewise, because *j* is not an option at the ends of words, the speech sound /j/ may be spelled with either *-ge* or *-dge*. English uses *-dge* right after an accented short vowel. Why? Because if it were not for the extra consonant protection of *d*, the letter *e* could reach back over the single consonant *g* and make the vowel say its long vowel sound (*badge, nudge* vs. *wage, huge*).

Here’s another example of a spelling convention: The letter *u* is a marker for the hard /g/ sound in words like *guest* and *guide*. To see why it is necessary, you’ll need to know one more example of the previous principle (that the spelling of a sound can be affected by its position in a word). Like the letter *c*,

when *g* is followed by *e*, *i*, or *y*, it has its soft sound (/j/ as in *gem, gist, and gym*). So, in the case of *guest* and *guide*, the letter *u* intervenes between the *g* and the *e* or *i*, requiring the *g* to have its hard /g/ sound.

Conventions like these were developed to help people pronounce words correctly. Consider the differences in pronunciation between these words: *hopping* vs. *hoping*, *hotter* vs. *hotel*, *bubble* vs. *bible*, and *comment* vs. *moment* (Snow et al., 2005). In each pair, the first word has a short vowel sound that is “protected” from being a long vowel sound by the double consonant.

Together, these five principles explain how English can be rich and varied, yet contain words spelled in regular and predictable ways. Virtually every word’s spelling can be explained by its language of origin, meaning, and/or sound structure. But, as we’ve seen with the many ways to spell /k/ and /j/, it’s not as if words are simply predictable or not: The predictability of English words exists on a continuum. Only a few phoneme-grapheme correspondences work all of the time (regardless of sound sequence), such as in *that, must, and pan*. Most of the correspondences are predictable, but are determined by the position of a phoneme in a word and/or a variety of spelling conventions. Yet other correspondences visually represent the meaningful parts of and relationships between words, often at the expense of phoneme-grapheme correspondences. Odd and truly unpredictable spellings, such as *of, aunt, and does*, are only a small percentage of words in English. But because they are often very common words (coming from Anglo-Saxon), they are used frequently and, as a result, probably contribute to the widespread myth that English is terribly irregular.

## II. Spelling Instruction

Five years ago, the National Reading Panel (NRP, 2000) omitted spelling (and writing) from its list of five essential components of a comprehensive reading lesson (which were phonological awareness, phonics, fluency, vocabulary, and comprehension). At the time, the best evidence on spelling indicated that phonological awareness instruction (which covers all levels of the speech sound system, including word boundaries, phonemes, syllables, etc.) improves spelling in first-graders, and that phonics instruction (which is more narrowly focused on the relationship between letters and the sounds) has a positive effect on spelling achievement in the primary grades. As a result, the NRP implied that spelling would develop in response to appropriate reading instruction.

Evidence from a scientific study of literacy published earlier this year, however, challenges at least part of the NRP’s assumption: A group of researchers in Houston who followed children from first through fourth grade found that spelling achievement can plummet while reading comprehension holds steady at about the 50th percentile. Mehta et al. (2005) conducted a longitudinal, large-scale study of literacy achievement with 1,342 students in 127 classrooms in 17 high-poverty schools in two urban environments. The study’s goal was to determine the extent to which five indicators of literacy—

word reading accuracy, passage comprehension, spelling, writing, and phonological awareness—were related to or independent of one another in children in grades one through four, and to show how those interrelationships might change at each grade level. With regard to spelling and reading, they found that better spellers tended to be better readers (and vice versa), but that, on average, the children tended to be much better at reading comprehension than at spelling. While the children’s passage comprehension scores fluctuated a bit from first to fourth grade, they remained close to average (the 50th percentile). Their spelling scores, however, dropped dramatically (see the table below). Children were learning to read at an average level, but their spelling achievement consistently decreased, dropping significantly below the national average by third grade and continuing to decline in fourth grade.

|         | Passage Comprehension |            | Spelling       |            |
|---------|-----------------------|------------|----------------|------------|
|         | Standard Score        | Percentile | Standard Score | Percentile |
| Grade 1 | 98.47                 | 47th       | 102.52         | 58th       |
| Grade 2 | 102.65                | 58th       | 98.72          | 47th       |
| Grade 3 | 99.70                 | 49th       | 91.31          | 29th       |
| Grade 4 | 97.61                 | 45th       | 87.84          | 20th       |

Clearly, we should not assume that progress in reading will necessarily result in progress in spelling. So, how then should spelling be taught? Given English’s complexity, teachers cannot hope to cover all of the rules of spelling. Instead, they should focus on teaching the ways in which English spelling is regular and predictable, as well as helping students memorize the most common irregular words. Even with young children, such instruction need not focus just on rules: Spelling can be approached as an exploration of language and then applied in various writing exercises. The less easily a child intuits the structure of words, the more vital is direct, systematic, long-term instruction in how our writing system works (Bailet, 2004). But all children, even those who are predisposed to be good spellers (Pennington et al., 1986), have much to learn about the history, structure, and representation of their own language that will pay off in many other verbal domains.

Research that directly compares or validates specific instructional methods is minimal (Apel et al., 2004; Bailet, 2004). But we do have some solid footing to draw on; research has identified the linguistic proficiencies that are essential to spelling and the developmental phases that children typically progress through as they learn to spell (Ehri, 2004; Moats, 1995; Templeton and Bear, 1992; Treiman and Bourassa, 2000). Drawing on this research, as well as the studies summarized in the introduction about the relationships between spelling, reading, and writing, I’ve worked with colleagues Bruce Rosow and Ellen Javernick to develop a comprehensive approach to spelling instruction for kindergarten through seventh grade that is designed to complement reading instruction. As Marcia Henry (1997) suggested, every layer of language or-

ganization merits attention in the elementary and middle school curriculum. A coherent progression for reading and spelling begins with phoneme awareness training and concludes with the study of Greek combining forms (i.e., the morphemes used in compound words) that are so prevalent in math and science vocabulary (e.g., *neuro*, *psych*, *ology*, and *chloro*). Phoneme awareness training is an obvious place to start, but what may not be so obvious is the importance of introducing young children to higher level content, such as some vowel teams, syllable types, and inflections (i.e., the suffixes, like *-s* and *-ing*, that alter words’ number, person, or tense). For example, first-graders should be introduced to the vowel-consonant-*e* syllable type since it appears in so many words they are learning to read and write, but those children may not master this syllable type until second or even third grade. Likewise, older children who are behind in spelling and/or reading may need to return to some lower level content they have not yet mastered. The following list provides the main content that I believe should be emphasized in each grade, but it does not list the years in which content should be introduced or the years in which some content may need to be reviewed. As a general rule, many spelling concepts are introduced early and then are studied in greater depth in later grades.

- Kindergarten: Phoneme awareness, letter names, and letter sounds
- Grade 1: Anglo-Saxon regular consonant and vowel phoneme-grapheme correspondences
- Grades 1-3: Irregular Anglo-Saxon words
- Grade 2: More complex Anglo-Saxon spelling (spelling according to the position of a sound in a word, letter patterns/conventions, and most common inflectional endings)
- Grade 3: Multisyllable words, including Anglo-Saxon syllabication, compounds, schwa, and most common prefixes and suffixes
- Grade 4: Latin-based prefixes, suffixes, and roots
- Grades 5-6: More complex Latin-based forms
- Grades 6-7: Greek combining forms

A complete discussion of what needs to be covered in each grade would be much too long for this article, but brief explanations of these topics and some teaching suggestions are presented in the box on page 17. As a general guide for covering the proposed content, about 15-20 minutes daily or 30 minutes three times per week should be allocated to spelling instruction. Application in writing should be varied but continual. While invented spelling helps young children learn more about phoneme-grapheme correspondences and frees them to focus on the ideas they want to write down, students should be expected to correct errors on words they have already studied, whether they do this through reference to a list, word wall, dictionary, or proofreading partner.

*(Continued on page 42)*

## Spelling Supports Reading

(Continued from page 22)

Spelling instruction may be old fashioned, but its importance has not diminished with computerized spell checkers—and there's no reason to believe that it will diminish in the foreseeable future. Even if spell checkers were improved dramatically, such that they caught virtually all spelling errors and supplied the right word as the first choice, the type of in-depth word study described here would still be extremely valuable to students. The benefits go well beyond good spelling: For young children, research clearly indicates that spelling supports learning to read, and for older children, it's likely that learning about the meaningful relationships between words will contribute to vocabulary growth and reading comprehension. The complexity of English gives us seemingly infinite choices among words when we're searching for the right way to express ourselves, and the language's regularity makes reading, speaking, and writing those words an achievable goal. □

### References

- Allen, K. (2005). Alphabet knowledge: Letter recognition, naming, and sequencing. In J. Birsh (Ed.), *Multisensory teaching of basic language skills*, 2nd Edition, pp. 113-150. Baltimore, Md.: Paul Brookes.
- Apel, K., Masterson, J.J., and Niessen, N.L. (2004). Spelling assessment frameworks. In Stone, C.A., Silliman, E.R., Ehren, B.J., and Apel, K. (Eds.), *Handbook of language and literacy: Development and disorders*, pp. 644-660. New York: Guilford.
- Baillet, L. (2004). Spelling instructional and intervention frameworks. In Stone, C.A., Silliman, E.R., Ehren, B.J., and Apel, K. (Eds.), *Handbook of language and literacy: Development and disorders*, pp. 661-678. New York: Guilford.
- Balmuth, M. (1992). *The roots of phonics: A historical introduction*. Baltimore, Md.: York Press.
- Bear, D., Invernizzi, M., Templeton, S., and Johnston, F. (2000). *Words their way* (2nd Edition). Columbus, Ohio: Merrill.
- Bryson, B. (1990). *The mother tongue: English and how it got that way*. New York: Avon Books.
- Berninger, V. Vaughan, K., Abbott, R., Brooks, A., Abbott, S., Reed, E., Rogan, L. and Graham, S. (1998). Early intervention for spelling problems: Teaching spelling units of varying size within a multiple connections framework. *Journal of Educational Psychology*, 90, 587-605.
- Bryant, P., Nunes, T. and Bindman, M. (1997). Children's understanding of the connection between grammar and spelling. In B. Blachman (Ed.), *Foundations of reading acquisition and dyslexia*, pp. 219-240. Mahwah, N.J.: Erlbaum.
- Carlisle, J.F. and Stone, C.A. (2005). Exploring the role of morphemes in word reading. *Reading Research Quarterly*, 40(4), 428-449.
- Carreker, S. (2005). Teaching spelling. In J. Birsh (Ed.), *Multisensory teaching of basic language skills* (2nd Edition), pp. 257-295. Baltimore, Md.: Paul Brookes.
- Ehri, L.C. (1998). Grapheme-phoneme knowledge is essential for learning to read words in English. In J.L. Metsala & L.C. Ehri (Eds.), *Word recognition in beginning literacy*, pp. 3-40. Mahwah, NJ: Erlbaum.
- Ehri, L. (2000). Learning to read and learning to spell: Two sides of a coin. *Topics in Language Disorders*, 20(3), 19-49.
- Ehri, L. (2004). Teaching phonemic awareness and phonics. In P. McCardle and V. Chhabra (Eds.), *The voice of evidence in reading research*, pp. 153-186. Baltimore, Md.: Brookes Publishing.
- Ehri, L. and Snowling, M.J. (2004). Developmental variation in word recognition. In Stone, C.A., Silliman, E.R., Ehren, B.J., and Apel, K. (Eds.), *Handbook of language and literacy: Development and disorders*, pp. 433-460. New York: Guilford.
- Grace, K. (in press). *Phonics and spelling through phoneme-grapheme mapping*. Longmont, Colo.: Sopris West.
- Graham, S., Harris, K.R., and Loynachan, C. (1994). The spelling for writing list. *Journal of Learning Disabilities*, 27 (4), 210-214.
- Hanna, P.R., Hanna, J.S., Hodges, R.E., and Rudorf, E.H., Jr. (1966). *Phoneme-grapheme correspondences as cues to spelling improvement* (USDOE Publication No. 32008). Washington, D.C.: U.S. Government Printing Office.
- Henry, M. (2003). *Unlocking literacy*. Baltimore, Md.: Brookes Publishing.
- Henry, M. (1997). The decoding/spelling curriculum: Integrated decoding and spelling instruction from pre-school to early secondary school. *Dyslexia*, 38, 178-198.
- Kessler, B. and Treiman, R. (2001). Relationships between sounds and letters in English monosyllables. *Journal of Memory and Language*, 44, 592-617.
- King, D. (2000). *English isn't crazy*. Baltimore, Md.: York Press.
- Lindamood, C.H. and Lindamood, P. (1998). *The Lindamood Phoneme Se-*

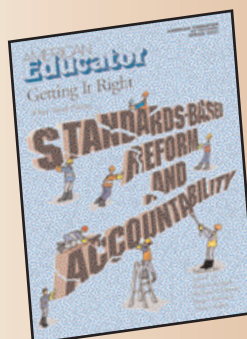
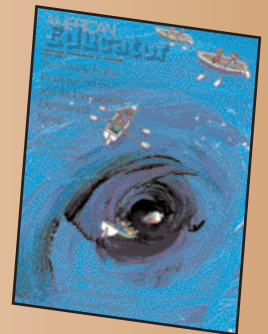
## American Educator

online!

Share *American Educator* without letting your copy out of sight. Easily print articles for your study group, e-mail colleagues links to your favorite articles, e-mail a letter to the editor, and review the guidelines for submitting your own article.

Visit [www.aft.org/pubs-reports/american\\_educator/index.htm](http://www.aft.org/pubs-reports/american_educator/index.htm)

It's just a click away!



- quencing Program for reading, spelling, and speech*. Austin, Texas: Pro-Ed.
- Mehta, P., Foorman, B.R., Branum-Martin, L., and Taylor, P.W. (2005). Literacy as a unidimensional construct: Validation, sources of influence, and implications in a longitudinal study in grades 1 to 4. *Scientific Studies of Reading*, 9(2), 85-116.
- Moats, L.C. (1995). *Spelling: Development, disability, and instruction*. Baltimore, Md.: York Press.
- Moats, L.C. (1996). Phonological spelling errors in the writing of dyslexic adolescents. *Reading and Writing: An Interdisciplinary Journal*, 8, 105-119.
- Moats, L.C. (2000). *Speech to print: Language essentials for teachers*. Baltimore, Md.: Brookes Publishing.
- Moats, L.C. (2003). *The speech to print workbook*. Baltimore, Md.: Paul Brookes.
- Moats, L.C. (2004). *Language essentials for teachers of reading and spelling (LETRS), Module 2, The Speech Sounds of English, and Module 3, Spellography for Teachers*. Longmont, Colo.: Sopris West Educational Services.
- Moats, L.C. and Rosow, B. (2002). *Spellography*. Longmont, Colo.: Sopris West.
- Montgomery, D.J., Karlan, G.R., and Coutinho, M. (2001). The effectiveness of word processor spell checker programs to produce target words for misspellings generated by students with learning disabilities. *Journal of Special Education Technology*, 16 (2).
- National Commission on Writing for America's Families, Schools, and Colleges (2005). *Writing: A Powerful Message from State Government*. New York: College Board.
- National Institute of Child Health and Human Development (2000). *The Report of the National Reading Panel*. Washington, D.C.: NICHD.
- Pennington, B. F., McCabe, L.L., Smith, S.D., Lefly, D.L., Bookman, M.O., Kimberling, W.J., and Lubs, H.A. (1986). Spelling errors in adults with a form of familial dyslexia. *Child Development*, 57, 1001-13.
- Sacks, D. (2003). *Language visible: Unraveling the mystery of the alphabet from A to Z*. New York: Broadway Books.
- Singer, B. and Bashir, A. (2004). Developmental variations in writing. In Stone, C.A., Silliman, E.R., Ehren, B.J., and Apel, K. (Eds.), *Handbook of language and literacy: Development and disorders*, pp. 559-582. New York: Guilford.
- Snow, C. E., Griffin, P., and Burns, M. S. (Eds.) (2005). *Knowledge to Support the Teaching of Reading: Preparing Teachers for a Changing World*. San Francisco: Jossey-Bass.
- Tangel, D. and Blachman, B. (1995). Effect of phoneme awareness instruction on the invented spelling of first-grade children: A one-year follow-up. *Journal of Reading Behavior*, 27, 153-185.
- Templeton, S. and Bear, D. (Eds.) (1992). *Development of orthographic knowledge and the foundations of literacy*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Treiman, R. and Bourassa, D. (2000). The development of spelling skill. *Topics in Language Disorders*, 20, 1-18.
- Uhry, J. K. and Shepherd, M. J. (1993). Segmentation and spelling instruction as part of a first-grade reading program: Effects on several measures of reading. *Reading Research Quarterly*, 28, 219-233.