Title:  Spelling Error Analysis

What Do Spelling Errors Tell Us About Language Knowledge

References & Related Readings:


Spelling Assessment: Charting a Path to Optimal Intervention

Spelling assessment includes identifying whether an impairment exists and determining the course of intervention. In this article, different procedures to sample and evaluate a student’s spelling skills are reviewed. Suggestions for further analysis of error patterns in spelling to determine possible causal or maintaining factors are discussed, guided by the use of the Spelling Analysis Flowchart. By utilizing this hypothesis-driven process, appropriate and effective instructional goals and methods can be formulated. Key words: assessment, literacy, spelling

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As the study of language development has broadened over the years to include the recognition of reading and spelling as language skills (e.g., Catts & Kamhi, 1999; Wallach & Butler, 1994), so, too, has the need to develop systematic and informative procedures for determining deficiencies in literate language development. Unfortunately, unlike the readily available literature on the assessment of early language skills (e.g., Lahey, 1988; Nelson, 1998), few specific guides for comprehensive literacy skills assessment are available. This lack of resources is most notably apparent for spelling assessment. Without a well-designed method for determining the presence of a disability and the possible factor(s) that may be causing the disability, language specialists may be less effective in their spelling intervention. In this article, we first will cover options for determining whether an individual’s spelling abilities are below expectations based on age or grade level. Next we will describe a process that can be used to identify specific areas of weakness and hypotheses about causal or maintaining factors. Use of
this process should lead to treatment goals and methods that are optimally suited for a specific individual.

IDENTIFICATION OF SPELLING DISABILITIES

There are three basic methods used to determine the status of a student’s spelling skills. In the first, *dictation*, the examiner reads aloud a list of words and the student is instructed to write the spelling for each. In the second, *connected writing*, the student is asked to generate text in response to a picture or as a story retell. In the third, *recognition*, the student is given a group of words that contain the correct spelling along with a few misspellings, or foils. The student is asked to indicate which spelling is correct.

Dictation

*Standardized tests*

There are several standardized tests or subtests that contain dictated word lists, including *The Test of Written Spelling-3* (Larson & Hammill, 1994), *Test of Written Language-3* (Hammill & Larson, 1996), and the *Wide Range Achievement Test-3* (Wilkinson, 1995). A raw score is calculated from each test or subtest and then converted to derived scores, such as a standard score/quotient, percentile, age equivalency, and grade equivalency. Descriptions of these tests can be found in Bain, Bailet, and Moats (1991) and Salvia and Ysseldyke (1995). Moats (1994) reviewed these tests and concluded that they met the minimal standards of the American Psychological Association for technical adequacy. Consequently, clinicians or teachers who must have a standard score for justification of placement in special education services may benefit from administration and scoring of one of these tests or subtests. However, Moats judged the tests inadequate for sufficiently sampling the domain of spelling or the child’s knowledge of English orthographic patterns.

*Word inventories*

The use of word lists to evaluate spelling skills has been in practice for decades. Many spelling textbooks have short test lists that precede each instructional unit. Approaches that are based on typical spelling development often employ word lists to elicit data for examination (e.g., Bear, Invernizzi, Templeton, & Johnston, 2000; Henderson, 1990; Mann, Tobin, & Wilson, 1987). Words included in the list vary from simple structures containing initial and final singleton consonants (e.g., “pet”), to those containing digraphs and diphthongs (e.g., “choice”), to those containing blends and inflections (e.g., “slipped,” “bended”) to complex derivations (e.g., “confusion”). These lists are valuable because they are designed to elicit words that represent specific types of spelling knowledge that occur at various points in the developmental process.

Inventory lists are scored by a variety of methods, including calculation of the number correct; identifying levels of mastery, instruction, and frustration; and analysis of the types or features of the spellings that are used. Most of these methods yield some type of developmental level that can be used to determine whether a student is at the expected level of spelling proficiency.

Moats points out that the domain of spelling is large, incorporating knowledge of orthographic patterns, sound-symbol correspondences, homophones, compounds, and morphological constructions (e.g., contrac-
tions, Latin plurals, and assimilated prefixes). To our knowledge there is no single, comprehensive list that can be used to gather all pertinent data. Furthermore, the nature of data that would be desired would, of course, depend on the developmental level of the student being evaluated. Regardless of which list is chosen, the wise language specialist will realize that it likely represents a starting point for data collection and, depending on the profile of correct and error spellings used by the child, additional data will likely be necessary.

Connected writing

Some language specialists may be concerned about using only word lists in spelling assessment because lists are decontextualized and have no communicative value. Furthermore, performance on word lists often does not mirror spelling during actual classroom writing tasks (Moats, 1995). Parents and professionals often lament the fact that children will score high on weekly spelling tests, yet continue to misspell numerous words in connected writing. Moats indicates that spelling accuracy may be influenced by the writing topic, motivation to write accurately, attention to task, and response mode (e.g., computer versus handwriting).

There are a few standardized tests with subtests designed to measure spelling skills in connected writing. For example, on the Spontaneous Writing subtest from the Test of Written Language (Hammill & Larson, 1996), the student is asked to generate a written story in response to a stimulus picture. Data are scored by subtracting the number of different misspelled words in the story from the total number of different words in the story. The raw scores may be converted to a percentile or standard score. Unfortunately, such subtests simply do not contain a sufficient number of words representing the necessary orthographic patterns to make the scores meaningful or helpful.

We have recently been experimenting with the use of retellings (Buchanan, 1989; Routman, 1991) to gather additional data on error patterns initially identified through single-word dictation tasks. We select words representing three or four error patterns of interest and construct a story that contains those words. The child writes the story as it is told by the examiner. The examiner tells the story in narrative fashion, pausing between story elements so that the student has time to write each portion. The student’s completed version of the story is then dictated in subsequent administrations for the purposes of charting response to treatment. This approach seems to have promise, as long as a sufficient number of exemplars representing each targeted pattern are included. Limiting the number of targeted patterns to four or five makes it possible to construct a story of reasonable length. Coupled with the data gathered from inventories, the opportunities for target pattern use in connected writing hold promise for valid measurement of spelling skills.

Recognition

Although recognition is commonly used in formal assessment of spelling, its value has, at the least, been questioned (Ehri, this issue) and, at the most, been dismissed altogether (for example, Moats, 1995). The spelling subtest of the Peabody Individualized Achievement Test—Revised (Markswardt, 1989) is typical of recognition tasks. It consists of 100 items, which, according to the authors, address basic visual discrimination, phonological awareness, and sound-symbol association. Each of the spelling
items contains a correct spelling of the target word along with three misspellings. For each item, the examiner reads the target word and uses it in a sentence. The student is instructed to mark the correct spelling, and each item marked correctly increases the raw score by one point. Raw scores are converted into typical derived scores, such as a standard score/quotient, percentile, age equivalency, and grade equivalency. Certainly the task of identifying misspelled words is different from formulating spellings. However, proofing is an important component of spelling skills and, whether through standardized identification tests or individualized tasks, the language specialist will likely want to see how the student responds to correct and incorrect spellings of target forms.

DESCRIPTION OF SPELLING SKILLS

Determining that a student’s spelling skills are below expected levels is only the first step of the assessment process. The data will need to be further analyzed to optimally formulate goals for instruction or treatment and establish appropriate baseline information for measuring the effectiveness of intervention. Consequently, the next step in the assessment process is to describe the child’s specific spelling skills.

A variety of taxonomies have been used to describe children’s spelling. Some of these are more general and based primarily on the linguistic category of the intended form. For example, Laframboise (1996) designated errors as occurring on homophones, consonants, vowel errors, inflected words, and reversals. Although this is helpful in quantifying misspellings, this type of analysis may not be as helpful in identifying goals for instruction.

Other systems focus on the forms used by the student, often referred to as “invented spellings,” to gain insight regarding the student’s knowledge of the spelling system. The inventories used by Bear et al. (2000) (see Tables 1 and 2) include lists of words that are arranged in order of increasing complexity. Bear and his colleagues provide a check sheet and error guide that are used to assign each spelling (whether correct or in error) to a specific stage (preliterate, early letter name, letter name, within word pattern, syllable juncture, derivational constancy). For example, for the target word “train,” the spellings “j,” “t,” and “tm” indicate early letter name performance; “jran,” “chrann,” “tan,” and “tran” indicate letter name performance; and “teran,” “traen,” “trane,” and “train” indicate performance at the within-word pattern stage (Bear et al., 2000).

Bear et al. (2000) describe feature analysis. Orthographic features that are important for the spelling level of interest (i.e., primary or elementary) are identified and then points are assigned for the inclusion of a designated feature in a given word. A total score for each feature is calculated. If a child uses the feature correctly in all of the targets or misses only once, the child is considered to have mastered the feature. If the child uses the feature correctly in some words, yet misses it in two or more other words, that feature is considered an appropriate instructional target. If the child misses the feature in all of the target words, it is considered beyond his or her instructional level.

The approaches described by Bear et al. (2000) are particularly good because they have the advantage of encouraging the language specialist to look systematically at the types of spellings the student is using and
make a hypothesis as to developmental level on the basis of these spellings. A potential shortcoming of these approaches, however, is the assignment of a student to a single stage or, at least, the transition between two stages. This is sometimes difficult because the data may not fit clearly within one stage. As Treiman and Bourasso (this issue) argue, stage theories may not fully account for the notion that children use multiple strategies and different kinds of knowledge (phonologic, orthographic, morphologic) throughout the course of spelling development. Furthermore, it is possible that a skill that appears to be mastered at a lower stage will become problematic again when word complexity or linguistic context increases. For example, representation of each sound with a letter is considered a basic skill and is thought to be mastered during the letter-name stage of development, which is certainly appropriate when considering monosyllabic words. However, as structural complexity increases and the student attempts to spell three- and four-syllable words, he or she may “revert” to a failure to represent every sound with a letter.

Instead of using the student’s spellings to determine a single stage assignment, we prefer to focus on the description of patterns of errors that are present in the spellings. As with most methods of language assessment, the identification of patterns of either correct or incorrect spellings depends on the collection of adequate data. Most standardized and criterion-referenced measures use 25 to 50 words to assess students’ spelling skills. Although there are no data to suggest the optimal sample size, a corpus of 50 to 100 words would appear to be an appropriate amount to capture patterns of spelling. Thus, an administration of a standardized test of spelling and one or more of the qualitative inventories previously described should provide a sufficient beginning. Samples of the student’s classroom writing also should be collected and added to the database. All of the student’s spellings—correct as well as incorrect—should be documented. As these words are analyzed, care should be given to the linguistic and situational contexts (e.g., dictation, connected writing within narratives) from which they are derived. These contexts may affect accuracy and performance.

The next step will be to identify patterns of spelling errors (i.e., mistakes that characterize more than one misspelling) that are present in the student’s sample. Familiarity with the components of the English spelling domain as well as common error patterns helps with initial descriptions. The errors encountered can be characterized by descriptive statements developed by the language specialist. Because the occurrence of many errors can be influenced by word complexity, pattern statements may need to be refined to reflect considerations such as syllabic structure.

The language specialist should identify three or four patterns that will ultimately become the initial focus of intervention. Selection of these patterns should be based on several factors. First, error patterns that operate with a reasonable degree of frequency should be selected. Decisions regarding this reasonable degree are not always straightforward. Certainly, an error that occurs on only a few of the possible opportunities would not be a priority for intervention based on the premise that the pattern will continue to be gradually mastered. On the other hand, when errors operate more frequently, the likelihood of eventual acquisition is decreased. We know of no set criterion (i.e., percentage occurrence) for indi-
individual error patterns that have been used to define the point at which instruction is necessary. Second, less complex patterns (i.e., those that typically develop earlier) should be chosen over more complex ones. Descriptions of patterns by developmental level can be found in Bear et al. and Henderson (1990). Third, target patterns that represent the potential to have a marked effect on the student’s writing should receive some priority.

EVALUATION OF RELATED ABILITIES

Spelling skills have been linked to a number of other literacy and literacy-related skills, including reading, phonological awareness, and morphological knowledge (Bear, Templeton, & Warner, 1991; Ehri, this issue). Researchers have found strong correlations among spelling and reading (e.g., Bear et al., 1991; Worthy & Viise, 1996), phonemic awareness, and morphological knowledge (Bear et al., 1991). Thus, it is wise to obtain data regarding the status of a student’s skills in these areas. These data may be readily available via teacher reports, student curriculum files, and student portfolios. Additionally, it may be necessary for the specialist to conduct individual testing in these areas. Regardless of the source of information, such additional assessment of these skills not only provides insight into the student’s overall pattern of strengths and weaknesses, but it also can be used later to formulate hypotheses regarding the nature of the specific spelling errors made by the student.

Reading

The ties between reading and spelling have been recognized for some time (Bear, Templeton, & Warner 1991; Ehri, this issue). As children read, they become exposed to the orthographic patterns and morphological markers that they must replicate in their spellings. Ehri (this issue) reports on studies that have demonstrated the direct influence reading has on spellings of new words. An assessment of a student’s reading abilities, then, will allow the language specialist to determine a possible co-occurring reading deficit as well as to identify a possible causative or maintaining factor for the spelling deficit.

Reading assessment typically takes the form of both standardized and non-standardized measures. Several standardized reading tests are available, including tests such as the Woodcock Reading Mastery Test-Revised (Woodcock, 1987), the Wide Range Achievement Test-3 (Wilkinson, 1995), and the Gray Oral Reading Test (Wiederholt & Bryant, 1992). Tests such as these most often assess a student’s ability to identify or recognize familiar words (i.e., sight-word reading); decode or sound out unfamiliar or nonsense words (i.e., phonetic decoding); and comprehend passages of text, either through cloze procedures, or by answering factual or inferential questions regarding the text. These tests offer the examiner the ability to determine whether a student is within normal limits, but, like the standardized spelling tests discussed previously, these measures provide little insight into the causes for reading difficulty or suggestions for intervention.

Miscue analysis, a non-standardized means to assess reading abilities, requires the language specialist to record all errors, or miscues, as a student reads aloud from a text (Nelson, 1994). Patterns of errors are identified, such as errors of reversals, semantic substitutions, and insertions or deletions.
of sounds. By examining the types of errors present during reading, the language specialist may develop a better understanding of other literacy-related skills known to be foundational to both spelling and reading that are deficient, including phonemic and morphological awareness (Nelson, 1994).

Phonological awareness

Phonological awareness is the ability to think about and manipulate the speech sound segments of a language (Blachman, 1994; Swank & Catts, 1994). For some time, phonological awareness, along with a knowledge of letter-sound correspondence, has been shown to be a strong predictor for spelling development (Nation & Hulme, 1997; Treiman & Bourasso, this issue). Development of phonological awareness progresses from early awareness of rhymes, alliteration, and sound play in the preschool years to later awareness of the individual sound segments that make up words (Adams, 1990). It is this latter skill, the ability to segment words into individual phonemes, that seems to best predict spelling abilities in children in the early elementary grades (Nation & Hulme, 1997). Although the relationship between phonological awareness and spelling appears to be reciprocal (i.e., practice with each helps the other), students need some phonological awareness skills to begin to decode words and translate phonemes into graphemes (Muter, 1998). Thus, segmentation tasks can be used to identify early possible causal or maintaining factors for spelling impairments.

There are several standardized measures of phonological awareness available to the language specialist to assess phonemic awareness skills (see Torgesen, 1999, for a review). Some of these tests focus exclusively on phonemic segmentation skills (e.g., Yopp, 1995). Others include a number of different phonological awareness tasks in addition to segmentation tasks, such as phonemic blending and generating words from phonemes. These tests include The Phonological Awareness Test (Robertson & Salter, 1997), The Comprehensive Test of Phonological Processes in Reading (Wagner & Torgesen, 1997), and the Analysis of the Language of Learning (Blodgett & Cooper, 1987). Although these tests vary in the ages on which they are normed and their psychometric strength, they nevertheless are means to determine how explicitly a student is able to think about the sound segments of the language.

For students who demonstrate difficulties in segmenting words into phonemes, language specialists can predict that spelling will be affected. However, phonological awareness is not the only literacy-related skill that affects spelling abilities. Morphological awareness, which relies on a student’s phonological, semantic, and syntactic knowledge, also plays a critical role in spelling development.

Morphological awareness

Morphological awareness involves the ability to be conscious of and manipulate the morphological units of a language (Carlisle, 1995). It involves the ability to identify base words and their inflected or derived forms. Awareness of morphological structure plays an important role in spelling (Carlisle, 1995). Because many word spellings cannot be explained or written using phonological knowledge, the explicit use of morphological knowledge becomes an increasingly important spelling strategy as students mature (Fowler & Lieberman, 1995).
A strong relationship between morphological knowledge and spelling has been established (Derwing, Smith, & Wiebe, 1995; Fowler & Lieberman, 1995; Treiman, Cassar, & Zukowski, 1994). Performance on morphological judgment tasks correlate significantly with general measures of spelling (Derwing et al., 1995; Fowler & Lieberman, 1995). Like phonological awareness, morphological awareness has a reciprocal relationship with spelling (Trieman & Bourassa, this issue). Experiences with spelling lead to greater understanding of the use of certain morphological forms, whereas an understanding of grammatical morphology leads to better or more accurate spelling.

Although there are standardized tests that can be administered to assess phonological awareness, the language specialist must rely on the spelling literature to construct non-standardized measures of morphological awareness (e.g., Carlisle, 1987, 1988, 1995; Carlisle & Nomanbhoy, 1993; Kamhi & Hinton, this issue; Treiman & Bourasso, this issue). Several techniques have been used to assess student’s’ morphological knowledge including spelling lists, cloze procedures, word judgment tasks, and suffix addition tasks. For example, researchers have asked young students to spell words that are phonetically similar on some aspect yet morphologically different on another (e.g., words containing two morphemes ending in a consonant cluster, such as “tuned,” versus words containing one morpheme ending in a consonant cluster, such as “brand”) (see Treiman & Bourasso, this issue, for a review). In cloze procedure tasks, students hear a word followed by a sentence and then are asked to complete the sentence with either the derived form or base form of the word initially presented (e.g., “magic,” David Copperfield is a ________). Students show most success on these tasks when they are given a derived form and are asked to provide the base word (Carlisle, 1987). Word judgment tasks require students to determine whether a pair of words represents a base word and either a false (table-vegetable) or real (teach-teacher) derived form (Carlisle & Nomanbhoy, 1993; Derwing et al., 1995). In suffix addition tasks, students must apply their knowledge of suffixes to nonsense words (Carlisle, 1987; Nunes, Bryant, & Bindman, 1997a). These tasks are similar to the familiar wug/wugs task of Berko (1958); however, students provide written rather than oral responses.

Poor morphological awareness skills may be caused by poor reading skills. With decreased or inadequate reading skills, there are fewer opportunities to benefit from repetitive exposures to inflectional and derivational morphology in spelling. In addition, poor morphological awareness skills may result from an overall deficit in general metalinguistic skills (Fowler & Lieberman, 1995). Thus, it is appropriate to assess other metalinguistic skills, including semantic and syntactic awareness, as well as additional language skills that may impact on students’ spelling abilities.

Additional language skills

Because spelling may be indicative of a more general, although subtle, language problem, it is important to assess other areas of language. Semantic and syntactic awareness may be measured using a number of standardized tests. For example, the Test of Language Development: 3, Intermediate (Hammill & Newcomer, 1997) requires students to actively think about word order (Sentence Combining and Word Ordering subtests) and the semantic similarities among groups of words (Vocabulary and
Generals subtests). Similarly, The Clinical Evaluation of Language Function-3 (Semel, Wiig, & Secord, 1995) contains subtests that assess syntactic and semantic awareness skills (e.g., Word Classes and Sentence Assembly subtests). Findings from these tests may explain deficits in morphological awareness as well as prove to be important when designing intervention stimuli and activities.

Other areas of language, including oral and written narrative skills and the understanding and use of complex syntactic structures in oral and written language, should be assessed to determine possible factors that may increase the demands needed to complete a writing task. If narrative or syntactic skills are delayed or deficient, then the working memory demands they place on a writer constructing a text may be great, resulting in a less than optimal level of resources devoted to the task of spelling. Findings such as this will influence the manner in which spelling is facilitated during intervention.

Finally, other factors may influence spelling development, such as cognitive development and the type of formal spelling instruction received in a school setting (Masterson & Crede, 1999). Although these factors may have important ramifications, we do not believe that their current status will have a direct bearing on the method the language specialist uses for spelling assessment. Consequently, the reader is directed elsewhere for pertinent literature (Masterson & Crede, 1999; Scott, this issue; Zutell, 1980).

HYPOTHESIS REGARDING NATURE OF EACH SPELLING ERROR

Once the language specialist has identified the error patterns of concern, the next phase of assessment involves developing hypotheses for the nature or cause of each error pattern. In addition to the factors that may contribute to spelling development reviewed earlier (i.e., phonological awareness, morphological knowledge), the language specialist also must gather information regarding the student’s orthographic knowledge and visual storage of spellings (Masterson and Crede, 1999). Orthographic knowledge involves the set of skills necessary to translate language from spoken to written form (i.e., the use of spelling strategies). Abilities in this area range from early selection of the appropriate letters to represent consonant sounds to an understanding of sophisticated orthotactic principles. Orthotactic principles refer to positional constraints on the use of graphemes to represent phonemes. Treiman & Bourasso (this issue) discuss several examples of orthotactic knowledge, including an appreciation for the principle that /k/ is spelled with a “ck” only in the medial or final position of words, never at the beginning. Similarly /t/ is spelled with ch in the initial word position and either tch or ch in the final position, depending on vowel tenseness.

Visual storage refers to the representation of images or templates for words, morphemes, and syllables in memory (Ehri & Wilce, 1982; Glenn & Hurley, 1993). These templates are called visual orthographic images (VOIs), and they are primarily developed through adequate exposure to print. It is possible that inadequate VOIs are related to the use of a partial-cues reading strategy by children (Glenn & Hurley, 1993). A partial cues reading strategy occurs when a child reads by selectively sampling parts of the word, usually the beginnings and endings and relies heavily on context to derive a reasonable guess (Frith, 1980). Use of this strat-
egy may limit the formation of visual images necessary for accurate spelling. Glenn and Hurley also mentioned that handwriting may affect the storage of visual orthographic images. Poor handwriting may inhibit the establishment of an adequate lexical representation in memory, which can, in turn, lead to compromised spelling skills. Glenn and Hurley cautioned that the early use of cursive writing might also make a child vulnerable to spelling problems because of the mismatch between the appearance of cursive and printed text. Given the potential negative contribution of cursive writing, language specialists may consider collecting data that are printed by the student.

When developing hypotheses about the nature of a student’s spelling difficulties, the language specialist will need to assess the student’s phonological and morphological awareness skills, as well as the student’s orthographic knowledge and visual storage. By determining which factor(s) may be causing or maintaining the spelling difficulties, the language specialist can develop specific strategies for spelling instruction or intervention.

The Spelling Analysis Flowchart (SAF, Figure 1) depicts a series of steps the language specialist may use to determine the cause(s) of a student’s spelling errors. The first four steps (i.e., collect a sample, identify misspelled words, describe patterns of errors, and select potential treatment targets) have been discussed previously. The remaining sections focus the specialist on determining the cause of the spelling errors. Error patterns dealing with base words (i.e., words that represent a single morpheme, including compound words) are analyzed separately from inflected or derived words (i.e., words that contain or reflect inflectional or derivational morphology). Examples of inflected words include “jumped,” “swims,” and “hitting”; examples of derived words include “recycle,” “health,” and “magician.”

Analysis of base words

Phonological awareness skills

The first step in making a hypothesis about causal or maintaining factors for each spelling error pattern in base words is to check phonological awareness (PA). The language specialist initially identifies whether a phonological awareness skill is needed for that particular spelling pattern. For example, if a student omits one of the consonants in consonant clusters with a reasonable degree of frequency (e.g., “fat” for “fast”), then the language specialist should determine whether the student is aware of the difference between singletons and clusters. The language specialist can examine the results of the standardized test of phonological awareness or develop specific, non-standardized tasks (segmenting, sorting, or identification tasks) that measure the phonological awareness skill in question. If the student performs poorly on these tasks, then it is likely that he or she does not have the necessary phonological awareness skill or at the least the skill is poorly developed. Intervention should focus on improving that skill. If no phonological awareness skill is required to spell the pattern correctly, or the student demonstrates the phonological awareness skill in question, then the specialist can begin assessing orthographic knowledge.

Orthographic knowledge and visual storage

If the cause of an error pattern does not appear to be a result of poor phonological
Figure 1. The Spelling Analysis Flowchart (SAF).

- Collect a Spelling Sample
- Identify Misspelled Words
- Describe Error Patterns
- Select Potential Treatment Targets for Follow up

- Does the student know the relationship between the base word and derived form?

- Does the rule regarding modification of the base word being used correctly (if applicable)?

- Is the inflection spelled correctly?

- Is there a PA skill that distinguishes the error from correct?

- Does the student evidence the skill?

- Is the error a legal spelling?
awareness skills, then the language specialist must determine whether the error pattern represents an allowable spelling in the English language (Bruck & Waters, 1988; Kamhi & Hinton, this issue; Lennox & Siegel, 1996). Judgments about allowable spellings must take into account orthotactic, or positional, constraints (see Kamhi & Hinton, this issue). For example, although “mach” may appear to be an allowable spelling for “match,” positional constraints of English dictate that the “tch” is typically used in the final position following a short vowel. Thus, to fully determine which misspelled words are allowable spellings, the language specialist must be well informed of orthographic rules that include positional constraints (Mersand, Griffith, & Griffith, 1996; Seiger, 1985).

When the language specialist determines that the error pattern represents an allowable spelling (e.g., “peech” for “peach” because /i/ is often spelled with the digraph “ee”), then the goal of intervention will be to increase visual storage for words containing this pattern. However, when the error violates an allowable spelling (e.g., “ckat” for “cat” or “cap” for “cape”), then intervention will focus on developing orthographic knowledge for the specific spelling patterns, including information about positional constraints. In some cases, allowable or non-allowable error patterns may be the result of an overgeneralization of an inflectional morphological rule. For example, Nunes, Bryant, and Bindman (1997a, 1997b) suggest that students will overgeneralize the use of inflected markers to words that are irregular in the use of that rule (e.g., “raned” for “ran”) or to words that contain the same final phoneme as the inflected form (e.g., spelling “soft” as “sfofed,” because of its phonological similarity to “coughed”). In these cases, the language specialist may decide to increase a student’s awareness of the general inflectional system in intervention, rather than target orthographic knowledge or visual storage.

Thus far, error patterns involving base words are analyzed to determine the appropriate course(s) of intervention. Additional errors patterns may involve words that are derivations of base words or contain inflectional markers. For these error patterns, a different set of steps to determine possible cause(s) for the error patterns is followed.

Analysis of inflected or derived words

Inflectional morphemes provide additional information about time (e.g., “-ed,” “-ing”) or quantity (e.g., plural “-s”) without changing the meaning or class of the word (Lund & Duchan, 1993). Derivational morphemes, which can be prefixes (e.g., “un-,” “re-”) or suffixes (e.g., “-tion,” “-er”), change the meaning or the word class (e.g., teach-teacher, friend-friendly, admire-admiration). In some cases, these derivational forms do not affect the base word (e.g., teach-teacher); in others, they alter the base word orthographically (e.g., happy-happiness) or phonologically (e.g., magic-magician) (Carlisle, 1987). Typically, with these modifications, the semantic link between the base word and the derived word is clear, or transparent (Carlisle & Nomanbhoy, 1993). However, derivations also can alter both the phonological and orthographic properties of the base word (e.g., health, sign-signal). These opaque forms may offer less clear semantic connections between the base and derived forms (Carlisle & Nomanbhoy, 1993) and, consequently, be more difficult to spell.

Because the error patterns for the inflectional and derivational aspects of morphol-
ogy differ, separate steps are used to analyze the respective error patterns. When an error pattern involves both inflections and derivations (e.g., “recycled”), the language specialist will need to decide whether one or both series of steps should be followed. In addition, if the errors that occur in inflected or derived words only involve the base word (e.g., “frendly” for “friendly”), then the language specialist should treat these errors as difficulties with the base words when determining the cause of these misspellings.

**Inflected word patterns**

When an error pattern is noted on words containing morphological inflections, the language specialist must determine whether the error is a misspelling of the inflected form itself or whether the error involves the rule governing the modification of the base word. For example, some students may represent the past tense marker solely by spelling the associated sound /d/ or /t/ (e.g., “jumpt” for “jumped”). In this case, intervention will need to target correct spelling of the inflection. If the error pattern involves a mistake in modifying the base word (e.g., “hoping” for “hopping”), then the language specialist will want to target the rules for modifying base words. In this example, the error pattern involved a lack of doubling consonants when adding a suffix to consonant-vowel-consonant base words, so the language specialist would establish a goal to facilitate the use of the doubling rule.

**Derived forms**

When a series of misspelled words representing derived forms is identified, the language specialist will need to determine a student’s awareness of the relationship between these base words and their derivations. This determination is accomplished in two ways. First, a search of the spelling sample may yield examples of the specific or similar base words and their derivations. Comparison of the student’s ability to correctly spell the base words versus the derived forms provides insight as to whether the student is using the knowledge of the base to spell the derivative form. If the sample does not contain examples of the base words and derivations, a cloze procedure can be used to determine the student’s morphological awareness for derived forms (Carlisle 1987, 1988). Failure to recognize and use the relationship between the base and derived form to spell such words may indicate a need to target morphological awareness skills in intervention. However, the ability to use morphological knowledge to spell derivatives only in structured tasks may indicate that there are tasks occurring during spontaneous writing that are competing for the student’s memory resources (e.g., demands of handwriting, complex syntactic structures) (Carlisle, 1987, 1995; Kamhi & Hinton, this issue). In this case, the goal of intervention will be to strengthen the student’s spelling of the derivational pattern.

Certain derivational error patterns may be more easily identified than others and apply across a variety of words and word classes. These error patterns typically involve derivations that either do not alter the base word or alter it minimally (i.e., phonological or orthographic changes). These changes are more transparent and allow the language specialist to identify and assess knowledge of derivational morphology using a variety of words and word classes that involve the application of the derivational pattern. Examples of these derived forms include words containing prefixes such as “un-,” “re-,” and “in-” and suffixes such as “-ly,” “-tion,” and “-ness”. However, opaque
derived forms (those that involve phonological and orthographic changes to the base word) may be less likely to be identified as patterns, simply because these errors apply to a smaller corpus of words. A good example is the relationship between “health” and “heal.” Spelling the word “health” as “helth” seems quite reasonable without the recognition of the relationship between the two words. Thus, what may seem like a random number of misspelled words may in fact be a series of words that are opaque derived forms. In this case, the language specialist may use morphological awareness tasks to assess and subsequently increase the student’s knowledge of bases and their derived forms.

SUMMARY

Armed with the knowledge of spelling development, orthographic rules, and the factors that influence spelling, language specialists have all the necessary tools to conduct a thorough and informative spelling assessment. As language specialists conduct spelling assessments, they must keep in mind that their goal should be to identify whether a spelling impairment exists and, if so, to develop appropriate goals and methods of intervention. Analysis of spelling errors based on error patterns enables specialists to form hypotheses for possible causative or maintaining factors, test those hypotheses, and develop a systematic plan for intervention. Because appropriate and effective intervention hinges on well-designed assessment procedures, it is imperative that language specialists use a logical and theoretically grounded approach to assessment. It is through such a methodical and data-driven process that language specialists can identify how best to help students with spelling impairments.

REFERENCES


What Do Spelling Errors Tell Us about Language Knowledge?

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Like reading, spelling is a written language skill that draws upon an individual’s repertoire of linguistic knowledge, including phonological awareness, and knowledge of orthography, vocabulary, morphological and semantic relationships; and mental orthographic images (Apel & Masterson, 2001; Apel, Masterson, & Niessen, 2004). Each of these areas of linguistic or “word study” knowledge contributes to spelling success (Treiman & Bourassa, 2000) and a deficit in any one of these areas of word study knowledge will manifest as a specific pattern of misspelling. Accordingly, the analysis of an individual’s spelling errors can be used to identify underlying linguistic deficits.

The Language of Spelling

Phonological Awareness

Individuals rely upon the phonological awareness skills of phoneme segmentation, sequencing, discrimination, and identification during the spelling or “encoding” process. They use phonological segmentation skills when spelling by breaking down words into smaller units—such as syllables and phonemes—then linking these smaller units to their written forms. They use sound sequencing skills to map the letters to sounds in the correct order. They use phoneme discrimination and identification skills to perceive differences between speech sounds (e.g., between the short vowel e and short vowel i sounds) and to recognize that a difference in sound signals a difference in meaning.

Orthographic Knowledge

Individuals also draw upon their orthographic knowledge during the encoding process. Specifically, individuals draw upon their knowledge of sound-letter relationships and knowledge of letter patterns and conventional spelling rules to convert spoken language to written form (Ehri, 2000; Treiman & Bourassa, 2000). Orthographic knowledge includes knowledge of specific letter-sound relationships (e.g., the / k /sound can be represented by the letters c, k, ck, cc, lk, ch, que); knowing which letter patterns are acceptable (e.g., the / k /sound is almost always spelled with the letter k at the end of a word after a long vowel sound); and understanding sound, syllable, and word position constraints on spelling patterns (e.g., the / k /sound at the beginning of a word is never spelled with the letters ck, cc, lk).
**Vocabulary**

Individuals use vocabulary knowledge to accurately store and retrieve the correct spelling of words. The knowledge of word meaning is particularly important for the correct spelling of homophone words (e.g., *bare* and *bear*). Vocabulary knowledge is also helpful to correctly spell the *wh* consonant digraph because the /w/ sound at the beginning of question words (*what, where, when, why, which*) is always spelled with the letters *wh*.

**Morphological Knowledge & Semantic Relationships**

Individuals also rely upon their morphological knowledge and knowledge of semantic relationships when spelling inflected or derived forms of words (Carlisle, 1995). Specifically, individuals rely upon their knowledge of letter-meaning relationships of individual morphemes (i.e., suffixes, prefixes, base words, and word roots), their understanding of semantic relationships between a base word and related words, and their knowledge of modification rules when adding prefixes and suffixes.

Inflected words contain suffixes that provide information about time or quantity without changing the meaning or class of the words (e.g., *walk-walked; cat-cats*). Derived words contain affixes (prefixes or suffixes) that change the meaning and sometimes the class of words (e.g., *cycle-recycle; friend-friendly*). When an individual is required to spell an unfamiliar word (e.g., *exception*), knowledge of the base word (i.e., *except*) and certain word endings (e.g., *-ion*) can help the student spell the unfamiliar word correctly. An individual draws upon knowledge of rules for modifying base words to correctly spell inflected and derived forms of words. Individuals also draw upon knowledge of semantic relationships and rules for modifying words to spell irregular plural nouns, irregular past-tense verbs, contractions, and possessive nouns. The use of knowledge of word parts and related words to spell words becomes increasingly important as individuals begin to spell words of greater length and complexity.

**Mental Orthographic Images**

Individuals need to develop clear and complete mental representations of previously read words. These mental images of words, also known as mental orthographic images (MOIs), are stored in an individual’s long-term memory after repeated exposure to them in print (Ehri & Wilce, 1982; Glenn & Hurley, 1993). Inadequate MOIs are often formed when individuals use inappropriate reading strategies such as partial cue analysis, a process whereby the student guesses the identity of a word after decoding only the first letter(s) of the word. Clearly and completely developed MOIs allow individuals to quickly recall and correctly spell words and word parts. Individuals must rely upon the mental image of a word when phonological awareness and knowledge of orthography, vocabulary, word parts, and related words are not sufficient to correctly spell a spelling pattern within a word (e.g., *rope* not *roap*, *bucket* not *buckit*, *actor* not *acter*).
Both children and adults use these different types of language knowledge throughout spelling development (Treiman & Bourassa, 2000). The amount that each area contributes to spelling development differs depending on an individual’s literacy experiences and the complexity of the words needing to be spelled. Initially, phonological awareness skills play a large role in early spelling development, yet other linguistic knowledge, such as orthographic knowledge and rudimentary morphological knowledge, may also be contributing factors (Treiman & Bourassa, 2000). With additional experiences and learning, spelling development may be positively affected through a deeper understanding and increased use of orthographic, morphological, and semantic knowledge and a larger number of clear mental orthographic images. At any point in spelling development, an individual’s spelling reflects his or her linguistic knowledge and literary capabilities at that moment in time. Accordingly, an individual’s misspellings are the “window” to underlying linguistic deficits.

**Spelling Errors Reveal Linguistic Deficits**

It is possible to identify an individual’s linguistic deficits through spelling error analysis because a specific pattern of misspelling is associated with each specific type of linguistic deficit. Analysis of an individual’s spelling errors reveals underlying deficits in phonological awareness, and in knowledge of orthography, vocabulary, morphological and semantic relationships, and mental orthographic images.

**Phonological Awareness**

When phonological awareness skills are weak or underdeveloped, spelling is negatively affected in very predictable ways. Typically, individuals with poor phonological segmentation skills will delete letters and syllables, usually omitting letters for less salient phonemes, especially those that occur in internal locations and in unstressed syllables, (e.g., *pat* for *past*, *relize* for *realize*). Individuals with poor sound sequencing skills commonly reverse the sequence of letters when spelling. Letters reversals most commonly occur for liquids and nasals in a word or syllable sequence (e.g., *flod* for *fold*, *bets* for *best*). Individuals with poor phoneme discrimination and identification skills are likely to spell distinct vowel sounds with the same letter (e.g., *bet* and *bit* both spelled *bet*), and add letters for phonemes that do not occur in a word (e.g., *ment* for *met*).

**Orthographic Knowledge**

Individuals whose orthographic knowledge is deficient often spell words incorrectly because they fail to recognize accepted spelling conventions. As such, the misspellings of individuals with orthographic knowledge deficits are predictably characterized by “illegal” substitutions (e.g., *cas* for *catch*), non-allowable letter sequences (e.g., *jrum* for *drum*; *kween* for *queen*), phonetically possible spellings that violate “rules” (e.g., *ran* for *rain*; *coatch* for *coach*), and violation of word position constraints (e.g., *fuj* for *fudge*).
Vocabulary

Individuals who have trouble applying vocabulary knowledge will confuse the spelling of homophone words (e.g., bear for bare) and parts of other words in which the correct spelling is determined by word meaning (e.g., the / w / sound at the beginning of question words what, where, when, why, which is misspelled as w).

Morphological Knowledge & Semantic Relationships

Deficits in morphological knowledge and knowledge of semantic relationships present their own predictable patterns of misspellings. The misspellings of individuals with these types of deficits are characterized by omission of morphemes (e.g., walk for walked), phonetic spelling of morphemes (e.g., walkt for walked, musishun for musician), failure to use spelling of the semantically related base word to correctly spell the inflected or derived form (e.g., ascend but assension for ascension), and misspelling of modifications when spelling inflected and derived forms of words (e.g., calfes for calves, crazyness for craziness).

Mental Orthographic Images

When mental orthographic images are weak or not fully developed, spelling is negatively affected in very predictable ways. The misspellings of individuals with weak or “fuzzy” mental images of words are characterized by “legal” substitutions (e.g., hed for head, roap for rope, lagh for laugh), misspelling of unstressed vowel sounds (e.g., buckit for bucket, acter for actor, bottle for bottle), and homophone confusions (e.g., bear vs. bare, won vs. one, which vs. witch).

Figure 1

The writing sample in Figure 1 was collected from Marissa, a seventh-grade student. It reveals a variety of linguistic deficits, including deficits in phonological awareness (e.g., repluic for republic, individial for individual, Amarican for America), vocabulary
knowledge (e.g., two for to and wich for which), morphological knowledge (e.g., justos for justice), and mental orthographic images (e.g., plege for pledge).

**Conducting an Error Analysis of Misspelled Words**

Using carefully constructed word lists that represent specific types of spelling knowledge used throughout the spelling-acquisition process and a theoretically grounded error analysis methodology, it is possible to collect and analyze an individual’s spelling for patterns of errors and to determine the linguistic deficits that are interfering with that individual’s spelling and reading. Once the linguistic deficits are identified, the professional has a clear roadmap for systematic instruction or remediation of spelling and related linguistic skills. This prescriptive method of assessment--also called a “multiple linguistic repertoire analysis--is very different from standardized spelling tests such as The Test of Written Spelling-4 (TWS-4; Larsen, Hammill, & Moats, 1999) or the Wide Range Achievement Test-4 (WRAT-4; Glutting & Wilkinson, 2005), which quantify spelling performance relative to peers. It is also very different from Stage Theory and spelling inventories (e.g., Bear, Invernizzi, Templeton & Johnston, 2000) that describe what letter patterns a student can and cannot spell. A prescriptive assessment goes beyond these other measures by using error analysis to determine why a student misspells words (i.e., what are the underlying linguistic deficits) and precisely what type of word study instruction is needed.

The multiple linguistic repertoire analysis method described here was first published by Masterson and Apel (2000). The method was further developed and subsequently republished by Apel, Masterson, and Niessen (2004). This method of assessment is implemented in the SPELL and SPELL-2 software assessment programs (Masterson, Apel, & Wasowicz, 2002; Masterson, Apel, & Wasowicz, 2006). Software programs save valuable time and enormously simplify the tedious task of conducting a prescriptive assessment. A criterion validity study (Masterson & Mooney, 2006) conducted with 135 students in grades 1-6 compared participants’ performance on SPELL to their performance on two subtests of the Woodcock Diagnostic Reading Battery (Woodcock, 1997) and the Test of Written Spelling-4 (TWS-4; Larsen, Hammill, & Moats, 1999). Pearson-r correlations and multiple regression analysis indicate SPELL validly measures students’ spelling abilities, decoding skills, and identification of sight words and that SPELL can be used to identify word study goals in a variety of grades and settings. However, a software program is not required to conduct a prescriptive spelling assessment. The principles and methods of the prescriptive assessment described in Steps 1-4 below can be applied by hand to identify an individual’s specific language deficits and to create an individualized intervention plan.

There are four basic procedural steps for completing the prescriptive assessment.

**Step 1:** As with any other measure of assessment, it is imperative that you begin with an adequate sample of the individual’s spelling errors so that the error analysis yields valid results. To do so, you must collect an adequate sample of
spelling for each spelling pattern (e.g., short vowel a, s-clusters, silent consonants, unstressed vowels, inflected words) within the individual student’s developmental spelling level. The domain of spelling patterns in the English language is quite large and several exemplars of each pattern must be collected to obtain a representative sample of the student’s spelling ability. A minimum of three exemplars for each spelling pattern is recommended. Depending on the developmental spelling level of the student, this may require a spelling sample of 80-185 words.

**Step 2:** Examine the student’s spelling of each spelling pattern to identify which spelling patterns are most frequently misspelled. These are the spelling patterns that will be targeted with explicit word-level instruction to remediate specific language deficits. Spelling patterns that are infrequently misspelled (greater than 60% accuracy) are more appropriately addressed by facilitating and reinforcing the student’s consistent application of language knowledge when writing, and by developing the student’s self-monitoring and proofing of his or her own written work in authentic writing tasks.

**Step 3:** For each spelling pattern identified and selected in Step 2, carefully analyze the nature of the individual student’s spelling errors. This detailed error analysis determines if the misspelling of a particular spelling pattern is caused by a deficit in phonological awareness, and/or in knowledge of orthography, vocabulary, morphological and semantic relationships, or mental images of words. A step-by-step flowchart is publicly available on the internet (www.learningbydesign.com) to assist the clinician in conducting this detailed error analysis by hand and a detailed, case-study example of how to complete the SPELL prescriptive assessment is presented in Wasowicz, Apel, and Masterson (2003).

**Step 4:** Write an instructional goal for each selected spelling pattern, indicating the most appropriate instructional method for the individual student for each spelling pattern. For example, “Student will improve spelling of the short vowel a sound by developing the skills to discriminate among vowel sounds and to map letters to sounds in words containing this spelling pattern. Student will improve spelling of derived words by developing knowledge of letter-meaning relationships for derivational suffixes and rules for modifying words when adding suffixes.”

This method of assessment has been successfully performed using the SPELL software with individuals as young as seven years of age, and with a variety of clinical populations including individuals with language impairments, severe speech and physical impairments, and hearing impairments; as well as with students who are in general education (Apel, Masterson, & Hart, 2004; Hart, Scherz, Apel, & Hodson, 2006; Kelman & Apel, 2004; Yakey, Wilkerson, & Throneburg, 2006). When done properly, this type of analysis may even be more sensitive than standardized measures of linguistic competencies. In other words, a student may score within normal limits on the more
general measure associated with the standardized test, yet linguistic deficits can be uncovered through spelling error analysis.

Once the linguistic deficits are identified, the clinician has a clear roadmap for systematic instruction or remediation of spelling and related linguistic skills. Research indicates that a multiple-linguistic approach to spelling instruction, as prescribed by SPELL and SPELL–2, leads to significant improvement in spelling performance and word-level reading ability (Kelman & Apel, 2004). When compared with traditional spelling instruction, the multiple-linguistic approach to spelling instruction, as prescribed by SPELL and SPELL–2, is significantly more effective (Apel, Masterson, & Hart, 2004).

Figure 2

The writing sample in Figure 2 was collected from Marissa after one year of multiple-linguistic spelling instruction prescribed by the SPELL method of assessment. In comparison to her previous writing sample, a smaller number of spelling errors occurred and the misspellings are qualitatively different. This writing sample reflects Marissa’s phonological competency coupled with more robust mental orthographic images of words after receiving multiple-linguistic spelling instruction.

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References


LINKING CHARACTERISTICS DISCOVERED IN SPELLING ASSESSMENT TO INTERVENTION GOALS AND METHODS

Julie J. Masterson and Kenn Apel

Abstract. This article presents two approaches to determining the goals and methods of instruction in spelling. One approach is to administer a standardized test, document the student’s grade-level performance, present lists of words at that grade level to the student, and then test his or her performance each week. The other approach is prescriptive and tailored in both assessment and treatment methods. A sample of words at the appropriate developmental level is elicited, and the student’s spellings for each sound are scored to identify the orthographic patterns that are not mastered. Next, the misspellings are analyzed to determine a likely cause for each. Omissions are classified as problems in phonemic awareness, illegal misspellings as difficulties in orthographic knowledge, and legal misspellings as deficiencies in storing mental graphemic representations. Finally, problems with juncture modifications or affixes are considered deficits in morphological knowledge. A case study illustrating treatment ramifications of each assessment approach is presented.

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Spelling seems to be a frightful judgment of divine wrath, which the righteous God has allowed to come upon us and oppress us for a long time on account of our school sins ...

(Ventzky, 1722, as cited in Burnham, 1906)

As the above quote suggests, spelling is not an easy or engaging task for many students. For students with learning disabilities (LD), it often is a challenging, difficult task that is viewed as best avoided (Berninger, 2000; Graham, 1999). However, neglect of spelling can lead to decreased academic, vocational, and social success. Because we must spell to convey our thoughts and ideas in the written mode, poor spelling can affect how teachers, employers, and peers view students’ general capabilities (e.g., Berninger, Abbott, Abbott, Graham, & Richards, 2002; National Commission on Writing for America’s Families, Schools, and Colleges, 2005). Thus, it is critical to help students develop spelling skills to meet their academic, vocational, and social needs. Improved spelling skills may positively impact students’ motivation to communicate through writing (Berninger et al., 2002).

Although methods for helping students improve their spelling abilities have varied over the years, the pre-
dominant teaching approach for spelling has been "The Friday Test" (Graham et al., 2008). Typically, word lists for the week are presented on Monday, various activities to facilitate memorization occur on Tuesday through Thursday, and the words are administered in a test on Friday. Unfortunately, this approach to word selection and instruction does not align with current understanding of the many linguistic strategies that can be used to spell words.

This article presents an alternative approach to spelling assessment and instruction. The approach is markedly different from common practice, in that the instruction is based on a prescriptive assessment that identifies the deficits in underlying linguistic sources of knowledge and the use of instructional strategies to fit the specific deficits. The linguistic strategies that can be applied to spelling words are the focus, as opposed to a primary focus on memorization of specific words.

**Spelling As a Linguistic Skill**

For several decades, researchers and educators have been writing about the linguistic nature of spelling (Apel & Masterson, 2001; Bear, Invernizzi, Templeton, & Johnston, 2004; Ehri, 1998; Henderson, 1990; Masterson & Crede, 1999; Masterson & Apel, 2000; Moats, 2009; Treiman, Cassar, & Zukowski, 1994). Contrary to the view of spelling as a rote memorization skill, spelling requires active consideration of the sounds, patterns, and meaning of written language (Masterson & Apel, 2000; Moats, 2000). For example, spellers can call upon their phonemic awareness skills (i.e., explicit knowledge of the speech sounds, or phonemes, of language) to determine the number and types of sounds heard in a word (Nation & Hulme, 1997). Spellers then can apply their orthographic awareness skills to represent those sounds in print. Orthographic awareness includes overt knowledge of the rules and patterns that govern what letter or letters are used to represent speech sounds in print. Using just these two linguistic sources of knowledge, a speller could hear the novel word *zut* and spell it correctly as *ZUT*. Using another example, the speller might hear the word *sume* and spell it in one of several reasonable, acceptable manners (*SIME, SIGHM, SIEM*). Because the long *i* vowel sound can be represented with a number of different long *i* orthographic patterns, the speller also must develop a mental graphemic representation (MGR) of the long *i* vowel pattern specific to a given word (Apel, 2009; Ehri & Wilce, 1982; Glenn & Hurley, 1993).

In the English language, each prefix and suffix attached to a word (affixes) is spelled the same regardless of the pronunciation of the affix (e.g., the past tense *-ed* is spelled the same, even though it sounds like a *-t* in *stuffed* and a *-d* in *strained*). Spellers can apply their morphological awareness (i.e., their conscious knowledge of morphemes, or the individual units of meaning in language, including prefixes and suffixes) to recognize this rule and spell affixes correctly. Spellers also may apply their morphological awareness to determine how the addition of a suffix may modify the spelling of a base word (e.g., *hope* to *hoping; tag* to *tagged*) and understand the relation between base words (e.g., *cycle*) and derived words that share meaning (e.g., *recycled, cyclotron, cyclical*) and thus, a portion of their spelling (see Carlisle, 1988, 2004). Finally, spellers must be knowledgeable about how word meanings influence word spellings. That is, spellers can rely on their semantic awareness to accurately spell homophones (e.g., *one vs. won*) and to recognize when correctly spelled words convey unintended semantic information (e.g., *The bread on that tire is thin.*).

Spellers can use their explicit awareness of all of these areas, including phonology, orthography, morphemes, and meanings of words, as well specific mental images of words, or MGRs, to spell accurately.

**Traditional Spelling Instruction Approaches**

In a national survey, 90% of participating first-through third-grade teachers revealed they used a "Friday Test" approach to teaching spelling (Graham et al., 2008). The majority of these teachers reported choosing weekly spelling lists from commercially available materials, basal readers, or other books read by the students. That is, word selection does not appear to be based on the developmental characteristics of the spellers. The only forms of individualization of spelling words were words from students' own writing samples or students' choices of words to learn. Sometimes a selected word list might represent high-frequency words, words particular to a theme or focus of the week (e.g., all words dealing with the weather), or words that can be grouped based on a specific orthographic feature (e.g., words containing internal doubled consonants, such as *summer* or *ladder*). Even when lists were based on orthographic pattern, teachers did not report using explicit discussion or instruction of the spelling pattern underlying the orthographic feature. Regardless of the origin of the list, this approach emphasizes getting students to memorize the words between Monday and Thursday of a given week and then pass the test administered on Friday.

Although nearly all teachers used the "Friday Test" instructional approach, a small minority reported using other approaches. One alternate approach, which sometimes is combined with the "Friday Test" approach, provides students with visible and permanent models of high-frequency words (often via word walls in the class-
room) to refer to when spelling (e.g., Manning & Underbakke, 2005). Another alternative approach allows children to use invented spelling in their writings (i.e., writing words the way they sound). This latter approach, which often is predicated on the idea that students should not be penalized for their spelling attempts so as not to discourage writing, is not really a teaching approach. Rather, it is an assumption about learning that relies on students acquiring knowledge of English spelling through experience rather than instruction.

Regardless of the approach educators take to teach students to spell, they share two common threads. First, minimal time is devoted to spelling instruction. In their national survey, Graham et al. (2008) found that the average amount of time spent on spelling instruction in the primary grades was 90 minutes per week, or about 5% of the students’ time spent in school. Interestingly, this is highly similar to reports of practices 100 years ago (Rice, 1897, as cited in Burnham, 1996). Second, these approaches provide little to no instruction for the development and use of the underlying linguistic sources of knowledge that support spelling. Although spelling relies on multiple underlying linguistic knowledge sources, most teachers do not teach children to use strategies based on their linguistic knowledge as they learn about the spelling system. In fact, teachers often are unclear about these linguistic knowledge sources themselves (Moats, 2009).

Interesting, researchers have demonstrated marked improvement in spelling when one or more of these underlying linguistic sources of knowledge are taught (Apel & Masterson, 2001; Apel, Masterson, & Hart, 2004; Berninger et al., 2003; Butyniec-Thomas & Woloshyn, 1997; Kelman & Apel, 2004; Kirk & Gillon, 2007; Roberts & Meiring, 2006). However, the successes of these experimental programs have not typically been incorporated into actual classroom practice.

Special instructional services for students struggling with spelling have not fared any better. A sizeable percentage of students, anywhere from 18% to 27% (Graham et al., 2008; National Assessment of Education Progress, 2005), continue to encounter spelling problems every day. Most alarming is the fact that 42% of teachers do not make any adaptation in their instruction to help these students (Graham et al., 2008). When teaching adaptations are made, they tend to take one of a limited number of forms, such as reducing the number of words for the “Friday Test,” reducing spelling homework, increasing the frequency of child and parent conferences, tutoring (in essence, reteaching the specific spelling words), and using spelling aids (e.g., computers) (Ediger, 2002; Graham et al., 2008). What is missing from this list is a focus on teaching strategies representing the underlying linguistic sources of knowledge that are needed to spell accurately.

**A Radical Change in Spelling Instruction**

Traditional spelling instructional practices emphasize the teaching of specific words. Such practices suggest that written English must be memorized, and provide no overt link to the underlying common patterns and rules that guide English spelling. As a result, educators are not providing students with knowledge of, and practice with, strategies that promote the use of the underlying linguistic sources of knowledge needed to spell accurately.

Compared to other means of teaching spelling, a strategic spelling instruction approach typically leads to better results (Wanzek et al., 2006). A dramatic change is needed to develop students’ spelling abilities, particularly students with LD who typically demonstrate difficulties with spelling far beyond those of their peers with typical learning skills (e.g., Landerl, Frith, & Wimmer, 1996; Siegel, 2008; Wanzek et al., 2006). Students who struggle with spelling would likely benefit from instruction that emphasizes and encourages the use of their linguistic awareness skills rather than instruction that focuses on memorization of a set of specific words. When educators help students develop their linguistic awareness skills and employ these abilities when they spell, spelling and even word-level reading tend to improve (Kelman & Apel, 2004).

For several years, we have advocated the use of a multilingual spelling approach both for students who have learning challenges (e.g., Apel & Masterson, 2001; Kelman & Apel, 2004; Masterson & Crede, 1999). At its core, a multilingual approach provides guided and mediated instruction and practice with strategies that originate from the development and use of students’ phonemic, orthographic, morphological, and semantic awareness, along with some instruction focused on developing clear MGRs. The focus is on demonstration and use of a set of strategies to be implemented across words. Students and educators benefit because the strategies can be applied to words across subjects and writing contexts.

**The multilingual spelling approach.** Lessons within a multilingual spelling approach focus on teaching students when and how to use their linguistic awareness skills to spell words. For example, to provide students with a strategy and practice of phonemic and orthographic awareness skills, activities that teach the strategy of segmenting words into their individual phonemes and then linking each sound to a letter(s) are used. In one activity, the student hears a word and then moves one bead per sound heard across a
string. He then places the string on his paper and writes at least one letter per bead.

To develop other orthographic awareness skills, we use word-sort activities as a strategy for discovering orthographic patterns (Apel & Masterson, 2001; Masterson & Crede, 1999; Wasowicz, Apel, Masterson, & Whitney, 2004). With this activity, the student is provided with a group of word cards, which he is then asked to separate into piles or stacks based on apparent commonality in the use of a specific orthographic pattern. For example, a word sort might contain cards with words such as letter, summon, babble, later, table, and bacon. The student would be guided into sorting the words into two piles, those with doubled consonants and those without, and then asked to detect the reason why certain words contain double consonants while others do not (in this case, the short vowel in the first syllable leads to the doubled consonant). Through this type of self-discovery, the student develops an understanding or awareness of a pattern that affects many words. Follow-up activities include finding words and spelling words that follow that pattern (see Apel, Wilson-Fowler, & Masterson, in press, or Masterson & Apel, 2007, for more information).

As a final example, we teach students to think about “word relatives” as a morphological awareness strategy (e.g., Apel et al., 2004; Wasowicz et al., 2004). Through models and analogies, students are shown how words can be related because they share the same base (e.g., locking, interlocked, and lockable share the root lock) or root word (e.g., autograph, graphic, and orthography all share the root graph). When students encounter a challenging word to spell, they are encouraged to (a) identify the main relative of the word and then (b) spell the complex word using that relative. As an example, a student who needed to spell action would be encouraged to think of its base (act) and to use that base word to spell the related word.

Across lessons emphasizing the development and use of linguistic awareness strategies, students are learning that spelling is logical and highly regular (Hanna, Hanna, Hodges, & Rudorf, 1966). Instead of viewing spelling as a large body of information to be memorized rote, students learn that linguistic strategies help them spell, and read, words for which they have not yet developed clear mental images. Such linguistically focused lessons may be particularly important for students with LD, who usually demonstrate less intuitive awareness of the linguistic sources of knowledge needed to spell.

A myriad studies have demonstrated that compared to their peers with typical skills, children with LD, particularly those with reading disabilities, present with poor phonemic awareness (e.g., Rack & Olsen, 1993; Torgesen, Wagner, & Rashotte, 1994), orthographic awareness and MGRs (e.g., Bowers, Golden, Kennedy, & Young, 1994; Manis, Doi, & Bhdhia, 2000; Wolter & Apel, 2010), and morphological awareness skills (Arnab & Elbro, 2000; Casalis, Cole, & Sopo, 2004; Siegel, 2008). Children with LD experience greater struggles segmenting and blending sounds in words, acquiring knowledge of and using typical orthographic rules and MGRs, and recognizing or identifying appropriate derivational forms. These difficulties in the different linguistic awareness areas are highly associated with their abilities to read and spell.

To optimize the multilingualistic spelling instruction, we administer a prescriptive spelling assessment. This type of assessment helps identify particular weaknesses in linguistic awareness. With prescriptive assessment, specific target strategies that address these weaknesses are chosen, leading to a more customized spelling instructional approach.

**Prescriptive Spelling Assessment**

At its core, a prescriptive spelling assessment identifies specific deficits in a student’s phonemic, orthographic, morphological, and semantic awareness, along with poorly developed MGRs, that are leading to frequent and consistent misspellings. We begin the prescriptive assessment by administering a spelling test that contains enough exemplars of different orthographic and morphological patterns (e.g., short and long vowels, digraphs, within-word doubling, inflections, derivations) to detect patterns in errors.

Once consistent spelling errors have been identified, we assign the error to a problem in the use of one or more linguistic knowledge sources. For example, when a student consistently omits letters for sounds in words, we identify the pattern as a lack of use of phonemic awareness. When a student consistently misspells a sound with a letter(s) that cannot represent that sound, or does not follow a rule for representing sounds (e.g., spelling long vowel sounds in closed, one-syllable words with one letter), we identify the pattern as a problem with orthographic awareness.

Morphological awareness problems would be evident in students’ misspellings when they consistently leave off an affix from a word (e.g., HIKE for hiked), misspell or incorrectly place an affix onto a base word (e.g., BADLE for badly or SWIMING for swimming), and spell base words or roots correctly but misspell their inflected or derived forms (e.g., attend, yet ATENSHTUN; music, yet MUIZISHUN). Misspellings that involve correctly spelled words that convey the wrong meaning (e.g., THEIR for there) represent difficulties with semantic awareness. Finally, students likely have insufficient or incorrect MGRs when they misspell words in ways that
are orthographically legal, yet incorrect, for the specific word (e.g., BIGHT for bite, ROIGHT for wrought). By using a prescriptive assessment, the area(s) in which a student needs instruction to aid correct spelling become known, whereupon spelling instruction is designed to target the specific needs.

As described, typical spelling instruction is not guided by a prescriptive assessment. In some situations, educators may administer a norm-referenced spelling test to determine whether students’ skills are age or grade appropriate. Such assessment procedures are not intended to guide educators in developing specific goals are objectives. Alternately, educators may administer a state-, district-, building-, or curriculum-based assessment to assess students’ spelling abilities according to a pre-set criterion. However, these assessments are not based on a multilingual view of spelling and, thus, do not provide guidance on which strategies may most benefit the students’ improvement in spelling (Beirne-Smith & Riley, 2009).

CASE STUDY

In this section, we provide a case study to contrast a traditional spelling instruction approach based on the curriculum for a specified grade level with the multilingual, prescriptive approach to assessment and instruction. We use the grade-level equivalent indicated by the student’s Test of Written Spelling-4 (TWS-4; Larsen, Hammill, & Moats, 1999) score and then describe a spelling curriculum appropriate for that level. It is important to emphasize that the authors of the TWS-4 specify that the “test’s results are not designed [italics are the authors’] to be used as the basis for instructional planning” (Larsen et al., 1999, p. 5). Nevertheless, we wanted to illustrate that even if the selection of spelling words is based on a student’s current “grade-level functioning,” there are marked differences in the instruction associated with this approach and the instruction associated with the prescriptive, multilingual approach. After the student’s TWS-4 score was converted to a grade-level equivalent, we consulted a popular spelling curriculum, the Saxon Phonics and Spelling Curriculum (Saxon; Simmons, 2003) and identified the lessons associated with the grade and month indicated by the TWS-4 score.

The multilingual, prescriptive approach to spelling instruction is illustrated by citing the student’s results and recommendations from the Spelling Performance Evaluation for Language and Literacy (SPELL; Masterson, Apel, & Wąsowicz, 2002). SPELL is administered via a microcomputer in a game format. Digitized stimulus words are presented to the student individually and then used in a sentence. Students keyboard their responses, and the system stores responses for later analysis. In SPPELL, students are first given a Selector Module, which contains up to 40 words consisting of a variety of base and multimorphemic words. The user is then given one of four word lists based on the ceiling achieved in the Selector Module. Although similar to word inventory lists that are currently available (e.g., Bear et al., 2004; Gentry, 1984), SPPELL was designed to ensure sample size that consists of sufficient exemplars for the patterns developmentally appropriate for the student.

Goal Selection for Instruction

Kirby, an 11:7 white male, was tested in March of his fifth-grade year. His raw score on the TWS-4 converted to a standard score of 70 and a grade-month equivalence of 2-2, so the Saxon lessons for Grade 2, Month 2 (Weeks 8-11; Lessons 36-55), were chosen as possible instructional goals (see Table 1).

Kirby’s performance on the Selector Module in SPPELL placed him at Level 4, the highest level of SPPELL testing. Consequently, SPPELL elicited Kirby’s spellings for words containing a variety of consonant patterns, consonant digraphs, vowels, clusters, within-word doubles, vocalic L and R, silent consonants, unstressed schwa in multisyllabic words, and words with inflections and derived forms.

Kirby’s SPPELL results are listed in Figure 1. Each orthographic pattern that was spelled with less than 60% accuracy was flagged as a potential instructional target. Instructional methods were recommended based on the nature of the majority of Kirby’s misspellings for each target. Example SPPELL recommendations for base words are shown in Figure 2 and for multimorphemic words in Figure 3.

The recommended targets for instruction from each approach are presented in the following paragraphs. Similarities and differences between the Saxon and SPPELL recommendations regarding consonant digraphs, vowels, and other potential instructional goals are highlighted.

Consonant digraphs. The Saxon lessons for Grade 2, Month 2, focus on some consonant digraphs. For example, Lesson 39 contrasts the phonemic and orthographic differences in the use of K and CK to spell the /k/ sound. The teacher was instructed to explain that the letter K was used when the sound followed a consonant or vowel digraph, and that the CK spelling was used when the sound followed a short vowel.

Kirby’s SPPELL results indicated that both of these forms were already mastered (K at 100% accuracy; CK at 80% accuracy) and not in need of further instruction. Saxon Lesson 51 introduces the NG with phonemic awareness activities involving base words containing the sound, followed by explanation of how the sound is
Table 1
Saxon Phonics and Spelling Lesson Topics for Grade 2, Month 2

Week 1
36. The Rule v-e (long v-silent/sneaky e)
37. Digraph oo
38. Digraph ee
39. Spelling with ck and k
40. Assessment

Week 2
41. Sight Words, Part 2
   been, bush, does, doesn’t, full, goes, pull, pulled, pulling, push, pushed, put, says, want, wanted
42. Final, Stable Syllable -ble
43. Final, Stable Syllables -dle, -fle, -gle, -ple, -tle, -cle, -sle, -zle
44. Compound Words
45. Assessment

Week 3
46. Spelling with ke and ve
47. Vowel y, /i/ (long i)
48. Vowel y, /e/ (long e)
49. Spelling the /e/ Sound (long e)
50. Assessment

Week 4
51. Digraph ng; nk
52. Digraph ph
53. Digraph ea
54. Sight Words, Part 3
   any, anymore, anyone, anything, anywhere, buy, done, every, everyone, everything, everywhere, many,
   none, only, people, trouble, very
55. Assessment

spelled with the digraph, NG. The lesson contrasts the
difference between NG and ING and also covers
the cluster, NK. Kirby spelled the NG words on SPELL with
100% accuracy and NK words (under Nasal Clusters)
with 83% accuracy. Consequently, neither of these
forms was recommended as an instructional target for
Kirby.

Two digraphs are listed by SPELL as targets for Kirby,
but neither was included in the Saxon curriculum for
Grade 2, Month 2. First, he spelled words with the WH
pattern with only 40% accuracy. Kirby used only the W
to spell several of the target words, which indicated ade-
quate phonemic awareness (the /w/ sound in whisker,
whistling, and whisking was marked with a letter) and
appropriate orthographic knowledge (i.e., /w/ can be
spelled with the letter W). Consequently, SPELL recom-
mended instruction that would focus on the establish-
ment of clear MGRs. Additionally, Kirby spelled words
with final CH or TCH with 60% accuracy. Examination
of his misspellings indicated that he used the CH
spelling for all words, including those that required
TCH. Thus, SPELL recommended instruction that would
increase Kirby’s awareness that the TCH was another
spelling for this phoneme, the conditions in which it
might be used (e.g., after a short a), and strategies for
ultimately establishing clear MGRs. The Saxon curricu-
ulum targets CH in Week 33 of kindergarten, and WH
and TCH in Grade 1. Consequently, Kirby would be
assumed to already have learned these orthographic tar-
guts by the time he reaches his TWS-4 spelling level; yet
he has not. This is particularly noteworthy, given that
Kirby was actually in Grade 5.
**Figure 1.** SPELL results for Kirby.

![SPELL](image)

<table>
<thead>
<tr>
<th>Spelling Pattern</th>
<th>Raw Score</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consonant(s)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b, d, p, t, v, f</td>
<td>60/64</td>
<td>94%</td>
</tr>
<tr>
<td>j, m, n, x</td>
<td>46/49</td>
<td>94%</td>
</tr>
<tr>
<td>r, l</td>
<td>9/30</td>
<td>30%</td>
</tr>
<tr>
<td>g, h, w, v, qu</td>
<td>10/18</td>
<td>100%</td>
</tr>
<tr>
<td>Hard 'c'</td>
<td>16/16</td>
<td>100%</td>
</tr>
<tr>
<td>k</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>Soft 'c'</td>
<td>9/10</td>
<td>90%</td>
</tr>
<tr>
<td>h</td>
<td>16/17</td>
<td>94%</td>
</tr>
<tr>
<td><strong>Consonant Digraph(s)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>'ng'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>'wh'</td>
<td>2/5</td>
<td>40%</td>
</tr>
<tr>
<td>'sh'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>'ch'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>Initial 'ch'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>Final 'ch, tch'</td>
<td>3/5</td>
<td>60%</td>
</tr>
<tr>
<td>'ck'</td>
<td>4/5</td>
<td>80%</td>
</tr>
<tr>
<td><strong>Long Vowel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a spelled as 'a'</td>
<td>6/6</td>
<td>100%</td>
</tr>
<tr>
<td>a spelled as 'ai'</td>
<td>4/5</td>
<td>80%</td>
</tr>
<tr>
<td>a spelled as 'ay, au, a'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>e spelled as 'o'</td>
<td>4/6</td>
<td>67%</td>
</tr>
<tr>
<td>e spelled as 'ee, ea, y, ey, i, ie'</td>
<td>2/8</td>
<td>25%</td>
</tr>
<tr>
<td>i spelled as 'i'</td>
<td>3/5</td>
<td>100%</td>
</tr>
<tr>
<td>i spelled as 'ie'</td>
<td>3/5</td>
<td>100%</td>
</tr>
<tr>
<td>i spelled as 'y, ie, igh'</td>
<td>4/6</td>
<td>67%</td>
</tr>
<tr>
<td>o spelled as 'o'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>o spelled as 'oo'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td>o spelled as 'oa, ough, ow'</td>
<td>3/5</td>
<td>60%</td>
</tr>
<tr>
<td>u spelled as 'u'</td>
<td>8/8</td>
<td>100%</td>
</tr>
<tr>
<td>u spelled as 'oo, u'</td>
<td>5/5</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Other Vowels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/a/ spelled as 'au, augh, o, aw' and /u/ spelled as 'u'</td>
<td>5/6</td>
<td>83%</td>
</tr>
<tr>
<td><strong>Diphthongs 'oy, oi, au'</strong></td>
<td>2/5</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Silent 'e' and Silent Consonants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditioning Silent 'e'</td>
<td>9/13</td>
<td>69%</td>
</tr>
<tr>
<td><strong>Non-Conditioning Silent 'e' and Silent Consonants</strong></td>
<td>6/12</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Inflected Words</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With 'ed, ing' Following Short Vowel</td>
<td>6/11</td>
<td>55%</td>
</tr>
<tr>
<td>With 'ed, ing' Following Long Vowel</td>
<td>6/9</td>
<td>67%</td>
</tr>
<tr>
<td>With 's, es' for Plural or Third Person Singular</td>
<td>9/16</td>
<td>56%</td>
</tr>
<tr>
<td><strong>Irregular Verb Forms</strong></td>
<td>3/7</td>
<td>43%</td>
</tr>
<tr>
<td><strong>Derived Words</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With Both Phonological and Orthographic</td>
<td>13/36</td>
<td>42%</td>
</tr>
<tr>
<td>With Orthographic Transparency Only</td>
<td>3/10</td>
<td>30%</td>
</tr>
<tr>
<td>With Phonological Transparency Only</td>
<td>2/9</td>
<td>22%</td>
</tr>
<tr>
<td>With No Transparency (Opaque)</td>
<td>6/21</td>
<td>29%</td>
</tr>
</tbody>
</table>
**Figure 2.** Example of SPELL recommendations regarding base word spellings for Kirby.

**SPELL**

Spelling Performance Evaluation for Language and Literacy

<table>
<thead>
<tr>
<th>Student: Kirby, School:</th>
<th>Date of Birth:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade: 5</td>
<td>Date of Test:</td>
</tr>
<tr>
<td>Level of SPELL Administered: 4</td>
<td>Age: 11 years, 7 months</td>
</tr>
<tr>
<td></td>
<td>Examiner:</td>
</tr>
</tbody>
</table>

**RECOMMENDATIONS, WITH DETAILED RESULTS:**

1. To improve spelling of Consonant Digraph(s): 'wh'
   - By developing clear and complete mental images of words containing this spelling pattern

<table>
<thead>
<tr>
<th>Spelling Pattern</th>
<th>Word Type</th>
<th>Raw Score</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>'wh'</td>
<td>simple</td>
<td>0/1</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>complex</td>
<td>2/4</td>
<td>50%</td>
</tr>
</tbody>
</table>

Words misspelled by student: wessor (whisker), wisked (whisks), wisking (whistling)

4. To improve spelling of Long Vowel: i spelled as 'iCe'
   - By developing orthographic knowledge of long vs. short vowel principles for this spelling pattern

<table>
<thead>
<tr>
<th>Spelling Pattern</th>
<th>Word Type</th>
<th>Raw Score</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>i spelled as 'iCe'</td>
<td>simple</td>
<td>1/1</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>complex</td>
<td>3/4</td>
<td>50%</td>
</tr>
</tbody>
</table>

Words misspelled by student: dissipat (despite), likable (likeable)

8. To improve spelling of Silent 'e' and Silent Consonants: Non-Conditioning Silent 'e' and Silent Consonants
   - By developing clear and complete mental images of words containing this spelling pattern

<table>
<thead>
<tr>
<th>Spelling Pattern</th>
<th>Word Type</th>
<th>Raw Score</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>'k(e)'</td>
<td>simple</td>
<td>0/1</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>complex</td>
<td>0/1</td>
<td>0%</td>
</tr>
</tbody>
</table>

Words misspelled by student: dissapenary (disciplinary), scissors (scissors)
Figure 3. Example of SPELL recommendations for multimorphemic word spellings for Kirby.

### SPELL

**Spelling Performance Evaluation for Language and Literacy**

Student: Kirby  
School:  
Grade: 5  
Level of SPELL Administered: 4  
Date of Birth:  
Date of Test:  
Age: 11 years, 7 months  
Examiner:  

**RECOMMENDATIONS, WITH DETAILED RESULTS:**

13. To improve spelling of Derived Words: With Orthographic Transparency Only
   - By developing morphological knowledge of semantic relationships between base words and derived forms and using knowledge of base word spelling to spell derived forms with this transparency
   - By using knowledge of base word spelling when spelling derived forms with this transparency
   - By developing morphological knowledge of rules for spelling derivational morphemes; Supplement morphological knowledge with phonological awareness, orthographic knowledge and mental orthographic images when appropriate

**Detailed results of spelling of Derived Words: With Orthographic Transparency Only**

<table>
<thead>
<tr>
<th>Spelling Pattern</th>
<th>Word Type</th>
<th>Raw Score</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Orthographic Transparency Only</td>
<td>simple</td>
<td>6/9</td>
<td>66%</td>
</tr>
<tr>
<td>complex</td>
<td>3/10</td>
<td>30%</td>
<td></td>
</tr>
</tbody>
</table>

Words misspelled by student: imagination (magician), resignation (resignation), criticise (criticize), legality (legality), addition (edition), commendation (commodation), residential (residential)

15. To improve spelling of Derived Words: With No Transparency (Opaque)
   - By developing morphological knowledge of semantic relationships between base words and derived forms and using knowledge of base word spelling to spell derived forms with this transparency
   - By using knowledge of base word spelling when spelling derived forms with this transparency
   - By developing morphological knowledge of rules for spelling derivational morphemes; Supplement morphological knowledge with phonological awareness, orthographic knowledge and mental orthographic images when appropriate
   - By developing morphological knowledge of rules for modifying base words when spelling derived forms with this transparency

**Detailed results of spelling of Derived Words: With No Transparency (Opaque)**

<table>
<thead>
<tr>
<th>Spelling Pattern</th>
<th>Word Type</th>
<th>Raw Score</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>With No Transparency (Opaque)</td>
<td>simple</td>
<td>0/0</td>
<td>0%</td>
</tr>
<tr>
<td>complex</td>
<td>6/21</td>
<td>29%</td>
<td></td>
</tr>
</tbody>
</table>

Words misspelled by student: description (description), extension (extension), basically (basically), excellent (excellent), commercial (commercial), pleasure (pleasure), simplify (simplify), feminize (feminize), occasions (cautious), citruses (citizens), violence (violence), permissive (permissive), compendence (competency), expeditious (expedient), continuity (continuity)
A comparative summary of the recommendations regarding consonant digraphs is shown in Table 2. Findings indicate that adhering to the instructional targets recommended by the standard curriculum, although adjusted for Kirby's difficulties in spelling, would result in unnecessary instructional time on targets already mastered (i.e., CK, NG, NK) and failure to address needs that the student continues to have (i.e., WH, CH, TCH).

**Vowels.** The Saxon curriculum for Grade 2, Month 2, focuses on several vowel targets, including the Vowel-Consonant-e pattern and vowel patterns OO, EE, Y (as /ai/ and /i/), and EA. The Vowel-Consonant-e lesson covers all of the long vowels spelled with the pattern, and the word list contains the pattern combined with several consonants (e.g., bare, made, safe). SPELL differentiates spelling of the V-consonant-e pattern based on target vowel.

Kirby's SPELL results indicated that he had mastered aC consonant-e (80%), oCe (100%), and uCe (100%); however, he had not mastered iCe (60%), so that pattern was flagged as a treatment target. The Saxon lesson for the digraph OO covered words with that spelling for the /u/ sound (e.g., boot, food, tooth, zoo) and the /U/ sound (e.g., took, foot, hoof, good). SPELL separates these spellings and classifies the former (OO for /u/) as one of the digraphs that are used to spell the "long u" sound. Kirby spelled these targets with 20% accuracy. Examination of his spellings indicated that he used the letter U to spell most of the words containing this sound, so SPELL recommended instruction that would increase Kirby's awareness that the OO was another spelling for this phoneme and strategies for ultimately establishing MGs. Use of the OO for /U/ is grouped with other spellings for monophthongs that are not categorized as either "short" or "long," and Kirby spelled these with 83% accuracy.

The long e sound /e/ is addressed in Saxon Lesson 38 (digraph EE), Lesson 40 (review of digraphs EE, E, and Y), and Lesson 53 (digraph EA). Kirby's SPELL results indicated that he spelled words containing various long E digraphs (ee, ea, e, ey, i, ie) with 25% accuracy. Vowels that were flagged by SPELL as requiring instruction for Kirby that were not addressed in Month 2 of the Saxon program included digraphs and other spellings for long O (60%) and digraphs and other spellings for long U (20%). Kirby's spellings for these structures tended to be legal; that is he used one of the other digraphs in his spellings (e.g., JURRIE for jury; LOWFS for loaves; FRUTE for fruit). Consequently, instruction focusing on strategies for developing clear and complete MGs was recommended for these orthographic targets.

Finally, SPELL also recommended instruction based on Kirby's spelling of words containing vowel diphthongs (oy, oi, ou, au), which Kirby spelled with 40% accuracy. Interestingly, the SPELL analyses determined that Kirby spelled most of these targets with an o-Consonant-e pattern (e.g., CHOOSE for choice; BLOSE for blouse). As a result, SPELL administered a discrimination task to determine whether Kirby was consistently aware of the difference between long O sound (/o/) and the diphthongs (/oi/ and /au/). This task uses the habituation paradigm, in which one vowel is repeated several times and then the other (target) vowel is randomly presented. The student is asked to click on the computer mouse when she or he hears the target vowel. Kirby did not respond accurately to this task; consequently, phonemic awareness activities that focused on the difference between the three sounds and their corresponding spellings were recommended. These vowel diphthongs are addressed in Grade 1 of the Saxon curriculum, and so once again, these deficiencies in Kirby's knowledge would have been considered already learned.

In summary, the results regarding vowel instructional targets were similar to those for consonant digraphs (see Table 2). Adhering to a standard curriculum for Kirby would result in time spent on many patterns that he already mastered while spelling patterns needing instruction would be ignored.

**Other goals.** Three general categories of words are targeted in Grade 2, Month 2, of the Saxon Spelling curriculum. Words containing a final "stable syllable" (i.e., -ble, -dle, -fe, -gle, -ple, -tle, -cle, -sle, -zle) are covered in Lessons 42 and 43. SPELL refers to these orthographic structures as "vocalic l spelled as el, al, etc." Kirby spelled words containing these structures with 71% accuracy, so instruction was not recommended.

Sight words, the second general category, are targeted in two lessons. The first focuses on several words that are high frequency (see Table 1); however, with the exception of done and none, these words are orthographically regular, so the purpose for addressing them as sight words and encouraging rote memorization rather than as exemplars of their respective orthographic patterns is unclear. The SPELL results associated with most of the spelling patterns included in both of the sight word lists indicated that they were mastered.

The third general goal targeted in the Saxon curriculum is compound words. SPELL does not assess the spelling of compound words because there are no spelling principles that uniquely govern them.

SPELL flagged several structures that were not addressed in Month 2 of the Saxon program as needing instruction for Kirby. These included words containing silent letters (e.g., know, comb), inflected words (i.e., words with grammatical markers for number and tense), and derived words (e.g., musician).
In summary, the two methods for determining instructional goals for all three categories of targets differed considerably. Using a set curriculum, the goals were determined by the curriculum’s publisher. Most of the lessons to be delivered did not align with the areas in which Kirby needed instruction according to SPELL. Additionally, some goals combined orthographic patterns that represented distinct and different phonemes. Using the prescriptive assessment, instructional goals were developed that likely addressed Kirby’s individual, specific spelling deficiencies.

**Instructional Techniques**

In addition to differences in instructional goals, Saxon, a traditional curriculum, and SPELL, based on the multilingualistic approach, also differ in instructional techniques. Lessons within the Saxon curriculum typically begin with a language/alphabet activity that is often unrelated to the day’s specific spelling goal. Activities may include reviewing the alphabet, alphabetization, origin of words, and discussing stress and accents. The language activity is followed by a brief review of lessons taught previously, and it often concludes with worksheets or activities (spelling from dictation, sight words, bingo, etc.) designed to reinforce spelling strategies.

Following the review, activities for the lesson are initiated. First, the lesson’s spelling target is usually taught using cards depicting words that involve that specific spelling pattern. The students then use the new pattern by writing words containing the target pattern on worksheets and identifying use of the new spelling pattern in various written words. Three days a week, the lesson ends with games intended for the children to practice their general reading, decoding, and fluency skills. After every fourth lesson (typically a Friday), a written and oral assessment is given. If students do not perform adequately, suggestions for remediation are provided.

Using the multilingualistic prescriptive approach, the lessons suggested for Kirby involve instruction in specific strategies for improving spelling as well as self-discovery activities to help him to develop firm knowledge.

---

**Table 2**

*Instructional Targets and Corresponding Status in Saxon Curriculum and the Multilingualistic Model (SPELL)*

<table>
<thead>
<tr>
<th>Targets Included in Saxon Recommended by SPELL</th>
<th>Targets Included in Saxon Mastered According to SPELL</th>
<th>Targets Included in Saxon Not Assessed in SPELL Level 4</th>
<th>Targets Recommended by SPELL Not Included in Saxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consonant Digraphs</td>
<td>Consonant K and</td>
<td>Digraph ph</td>
<td>WH, CH, TCH</td>
</tr>
<tr>
<td>iCe</td>
<td>aCe, oCe, uCe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OO for long u</td>
<td>OO for spelling /U/</td>
<td>Other long o spellings</td>
<td></td>
</tr>
<tr>
<td>EE, EA for long e</td>
<td>Long I as Y</td>
<td>Other long u spellings</td>
<td></td>
</tr>
<tr>
<td>Long e as Y</td>
<td></td>
<td>Diphthongs OY, OI, OU, AU</td>
<td></td>
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<tr>
<td>Vowels</td>
<td>Stable syllables</td>
<td>Compound words</td>
<td>Non-conditioning E and other silent consonants</td>
</tr>
<tr>
<td>Other</td>
<td>(Consonant+le)</td>
<td></td>
<td>Words with past tense and plural inflections</td>
</tr>
<tr>
<td></td>
<td>Spellings of patterns in most sight words</td>
<td></td>
<td>Derived words</td>
</tr>
</tbody>
</table>

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of orthographic patterns that govern how words are spelled. For example, one of Kirby’s goals was to develop the ability to discriminate between the long O sound and the diphthongs /oi/ and /au/. Thus, lessons would focus on activities that required Kirby to listen to differences among the vowels and then differentiate which vowel was present in words produced by his instructor (see Wasowicz et al., 2004, for examples).

Kirby would also be engaged in lessons that led to self-discovery of orthographic patterns for which he lacked knowledge. Typically, these activities would involve word sorts (e.g., Apel & Masterson, 2001; Masterson & Crede, 1999; Wasowicz et al., 2004; see description above). For example, one of the patterns with which Kirby struggled was representing the /ch/ sound with the correct orthographic representation (i.e., TCH or the CH). A word sort would be developed that involved sorting into two piles word cards that contained either TCH words (e.g., catch, watch, splat) or CH words (much, touch). Through guided discovery, he would be encouraged to determine that /ch/ sound at the end of a word is typically spelled with a TCH when it is preceded by a short a /æ/, short e /ɛ/, or short o /ə/ sound.

Finally, some of Kirby’s errors were due to incomplete or erroneous mental images of written words (i.e., MGRs), an activity that encourages Kirby to develop clear, accurate MGRs would be provided. In one lesson, the focus would be on looking at specific words that are written with vowels in one color and consonants in another and discussing the specific letters, their shapes, and the order in which they occur in the word (see Wasowicz et al., 2004). After talking about the word and its component letters, the instructor removes the word and the student is encouraged to picture the word and spell it both forward and backward. The ability to spell the word backward suggests the student has stored an adequate representation of the word.

The multilingual spelling instructional approach differs from the traditional spelling teaching approach in notable ways. First, as mentioned, the target lessons are based on students’ identified spelling needs, rather than a set curriculum. Equally important, students do not receive a lesson for four days, take a test on a prescribed number of words, and then move on, regardless of whether they have achieved competency on the instructional goal. Rather, the focus of the lesson is to develop knowledge of strategies and principles to successfully spell the target pattern and to apply those strategies and principles to all relevant words.

SUMMARY AND DISCUSSION

Educators interested in improving students’ spelling skills have typically taken a traditional route to spelling instruction: providing lists of words on Monday and testing students’ retention of those words on Friday. This “Friday Test” approach treats written words as items to be memorized and deemphasizes the linguistic knowledge that supports words’ spellings. When educators rely on prescribed lessons, students may receive instruction for spelling patterns for which they already demonstrate competency while not receiving instruction on patterns that are not mastered. Conversely, when a prescriptive, multilingual assessment approach is applied, spelling deficits are identified and specific lessons, tailored to the student’s spelling needs, are provided. The case study focused on Kirby illustrates these principles.

In our case study, we chose lessons from a published curriculum based on the student’s results on a norm-referenced spelling measure. One could argue that few instructors would choose such a strategy for developing teaching objectives. Indeed, the authors of the TWS-4 suggest educators should not base instructional objectives on the test’s findings. However, without using a guide to goal selection that is somewhat tied to a student’s capabilities, it seems that instructional lessons would be even further removed from the needs of the student. In fact, many curricula only address spelling through the early elementary grades. The Saxon curriculum goes through grade 3, so had Kirby attended a school that used these materials, his spelling deficiencies might not have been addressed at all.

Implications for Practice

Our case study illustrated the use of prescriptive assessment to meet the needs of a specific student. Many professionals engage in one-on-one treatment formats. However, many others are responsible for addressing the literacy skills of a group of students or perhaps an entire class. We have conducted two studies that have focused on use of the multilingual model in classroom situations. In the first (Apel et al., 2004), we provided multilingual spelling instruction to a third-grade class while another third-grade class received the traditional spelling instruction approach. The classes were similar in ethnic and linguistic backgrounds and the number of students receiving special services. Children in both classrooms were pretested with a 40-word spelling list.

The multilingual spelling instruction approach was composed of three units: three weeks of instruction in phonemic awareness tied to spelling (e.g., sound string activities); three weeks of strategic orthographic rule instruction (e.g., word sorts); and three weeks of morphological awareness lessons (e.g., word relatives). Both groups received instruction twice a week for approximately 50 minutes. After nine weeks of instruction, test results using the same 40-word list indicated that the
children receiving the multilingual approach had improved their spelling skills, with a medium effect size ($d = .65$); the spelling skills of the children receiving the traditional spelling instruction showed no improvement ($d = -.07$).

In a second study (Masterson, 2009), multilingual word study implemented in a classroom setting effectively improved average standard scores in real and nonsense word reading and spelling in connected writing samples of children in grades 3, 4 and 5. In this study, SPELL was administered to all students in at the end of grades 2, 3, and 4 for three years. Recommendation reports were analyzed over the summer to identify the common word study targets and associated type of instruction. Classroom teachers then implemented the indicated word study lessons. For this project, graduate research assistants completed the analyses of the SPELL reports, compiled the findings, and listed specific recommendations for instructions.

The feasibility of this approach for a single teacher or practitioner is questionable. However, Learning By Design recently released a version of SPELL (SPELL-2G) that yields grouping suggestions for students who have taken the assessment. Students can be grouped by instructional target (e.g., long e digraphs, consonant blends) or type of instruction (i.e., phonemic awareness, orthographic knowledge, establishment of MGRs). Once students' needs are identified and students are grouped accordingly, implementation of multilingual word study within a group context should be no more challenging than treatment with an individual student. In fact, there may be unique opportunities in group work, as children get to hear group members respond, ask questions, get feedback, and so on. Further research is needed to document the benefits of instruction administered to groups recommended by SPELL-2G.

As the quote at the beginning of this article suggests, spelling and the associated "Friday Tests" have long been viewed as necessary evils to be overcome. However, when educators become aware of the underlying linguistic sources of knowledge that guide spelling, goal selection and instructional lessons are better informed and optimally tailored to students needs. Such informed educational practices increase the possibility of students meeting the academic and social demands they face daily.

REFERENCES


NOTES

1 The authors of this article are co-authors of SPELL and the later revisions, SPELL-2 and SPELL-2G, and have a financial interest in the software programs. Although the analyses and recommendations discussed in this case study were yielded by SPELL, they are based on the multilingual model and could be done by hand. In other words, they are not contingent upon use of the software.

Please address correspondence about this article to: Julie Masterson, Department of Communication Disorders and Sciences, Professional Building 247, 901 S, National Ave, Springfield, MO 65897; e-mail: JulieMasterson@MissouriState.edu
Tim is a 10-year-old, fourth-grade boy who has completed a language and literacy assessment with his school’s multi-disciplinary team. Since first grade, Tim has received speech and language services for oral syntax and semantics, and special education services for reading. Tim’s most recent assessment revealed that he has deficits in semantics, reading decoding, reading comprehension, writing, and spelling. The speech-language pathologist (SLP) found that Tim’s phonological awareness skills and morphological awareness skills were below what is expected of a child his age. Specifically, Tim had difficulty segmenting phonemes. When he was administered a morpheme generation task in which he was given a base word (e.g., explode) and was asked to use this word to fill in a sentence (e.g., The loud sound was caused by the _____. explosion), he was not able to generate an appropriate word derivative (e.g., explode – explosion).

Given this assessment picture, the SLP is faced with the task of determining appropriate treatment that will make the biggest impact on Tim’s academic success and of coordinating these services with the other members on the multi-disciplinary team. She recently heard of using multiple-linguistic word study as a way to facilitate the language components of morphological awareness and phonological awareness, and is interested in determining whether such an approach may help Tim in his phonological, morphological, semantic, and literacy success.

Before we address Tim’s specific case, let’s take a brief look at what is meant by a multiple-linguistic word-study approach, define the underlying language principles of such an approach, and briefly summarize the research of each linguistic principle in relationship to language and literacy achievement.

**Multiple-Linguistic Word Study Defined**

Word study, specifically the linguistic analysis and focus on spelling, may provide a valuable language-based tool for the SLP when assessing and treating children with language-literacy deficits (LLD). Spelling is a language-based skill (Bailet, 2004) and the awareness of sounds in words (phonological awareness), knowledge of the spelling patterns in words (orthographic knowledge), and understanding of relationships among base words and their inflectional and derivational forms (morphological awareness) all influence spelling acquisition, vocabulary, reading decoding, reading comprehension, and writing development (Apel, Masterson, & Neissen, 2004; Bourassa & Treiman, 2001). A developmental treatment approach that incorporates spelling and nurtures these multiple linguistic factors may be an effective way to facilitate language and literacy success for children with LLD.

Because word study involves the practice of analyzing and facilitating spelling, SLPs often view this as a skill outside their scope of practice. However, it can be argued that when spelling-based word study is used as a tool to assess and facilitate language-specific goals, it can provide an assessment window to determine where linguistic breakdowns occur and a tool to prescriptively facilitate the linguistic underpinnings of phonemic awareness, morphological awareness, and/or orthographic knowledge. Given the SLPs’ expanding scope of practice, which includes written language (ASHA, 2001), assessment, and treatment approaches such as spelling that may facilitate language development in multiple areas of vocabulary, reading, and writing are appropriate and a welcome interpretation and therapy tool.

**Phonological Awareness**

Phonological awareness is the ability to recognize and store linguistic codes or phonemes and later retrieve and produce them in an appropriate manner. Phonemic awareness is a subcategory of phonological awareness that is specific to manipulation, blending, and segmenting of phonemes. For example, the word *cat* phonemically...
segmented is /k/-/æ/-/t/. Phonemic awareness is an important and integral part of literacy development because it best predicts reading and spelling achievement (Catts, Fey, Zhang, & Tomblin, 2001). A reciprocal relationship exists between phonemic awareness and literacy development: phonemic awareness strengthens literacy skills while reading and spelling strengthen skills in phonemic awareness. An impressive body of research documents the crucial role of phonemic awareness in reading and spelling (e.g., Bird, Bishop, & Freeman, 1995; Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2002).

Orthographic Knowledge

Orthographic knowledge involves the translation of sounds to letter(s), or phonemes to graphemes, which requires the knowledge and use of general spelling rules and patterns (e.g., long- and short-vowel rules). For example, the vowel in the word cat is pronounced as a short vowel and spelled with the single consonant of a, which is consistent with the short-vowel-a spelling rule. Additional factors involved in orthographic processing may include the implicit appreciation for orthotactic, or positional, constraints on the sequences of graphemes that are used in words (e.g., ck cannot occur at the beginning of an English word). Researchers believe that children use their orthographic knowledge of individual letters, letter sequences, and spelling patterns to recognize words visually while reading and spelling (Ehri, 1992; Share, 2004).

Apel and Masterson (2001) have presented a model in which phonological knowledge is connected to orthographic knowledge (i.e., sound-letter correspondence) to form images of words referred to as Mental Orthographic Representations (MORs). This is based on the work of Ehri (1980), who hypothesized that children develop MORs by making connections between graphemes and corresponding phonemes as they sound out novel words. The establishment of these phoneme–grapheme relations results in the ability of children to bond spelling (orthography) to pronunciation of words (phonology). According to Ehri, these orthographic images develop gradually as the child develops a more complete awareness of the alphabetic system, phoneme–grapheme correspondences, and consistent identification of across-word patterns.

Researchers have documented the importance of orthographic knowledge in literacy development (e.g., Apel, Wolter, & Masterson, 2006; Cunningham, 2006; Evans, Williamson, & Pursoo, 2008). Additionally, this skill has been associated with children’s development of reading-word recognition and spelling (Ehri & Saltmarsh, 1995; Share, 2004).

Morphological Awareness

Morphological awareness can be defined as the awareness of the morphemic structure and the ability to reflect on and manipulate that structure. Morphemes are the smallest units of words that carry meaning. For example, the word cats is composed of two morphemes, the base word cat and the plural –s morpheme. Morphological knowledge includes a knowledge of inflections (i.e., affixes to root words that indicate grammatical information such as tense or number, such as help plus –ed) and derivational forms (i.e., changes to the base word to create a new word, which generally change the grammatical category, such as sad to sadness).

Morphological awareness is correlated with a well-developed grammar system, increased vocabulary development, and high reading achievement (e.g., Carlisle & Nomanbhoy, 1993; Nagy, Berninger, & Abbott, 2006). Specifically, knowledge of morphology helps children to spell, decode, and comprehend new words (e.g., Carlisle, 1996, 2000; Elbro & Arnback, 1996; Windsor, 2000). This is not surprising given that approximately 60% of new words acquired by school-age children are morphologically complex (Anglin, 1993).

Multiple-Linguistic Word-Study Spelling

Researchers have recognized the importance of phonological awareness, orthographic knowledge, and morphological awareness in children’s language and literacy development. As a result, these factors have been integrated into word-study spelling instructional programs and practices (Bear, Invernizzi, Templeton, & Johnson, 2004; Wasowicz, Apel, Masterson, & Whitney, 2004).

These types of instructional approaches focus on applying multiple-linguistic strategies (phonologically segmenting, referring to an orthographic spelling rule, or utilizing the morphological knowledge of a base word) during the spelling process. For example, in an orthographic knowledge lesson, children may be asked to differentiate between spellings of the long-vowel-a pronunciation, spelled with the two-vowel orthographic...
pattern of *oa* (e.g., words such as *boat*, *goat*, *float*) and the short-vowel *o* pronunciation spelled with the single-vowel orthographic pattern of *o* (e.g., words such as *hot*, *lot*, *pot*). By sorting the words according to the orthographic pattern, children create their own meaning and ultimately learn the orthographic rule.

Given the nature, scope, and relationship between phonological, orthographic, and morphological dimensions of language literacy, the oft-heard criticism that “written language interventions are not in the SLP’s scope of practice” is at the very least, questionable.

**Purpose**

Although a multiple-linguistic word-study spelling approach is grounded in theory and research (Hall, Cunningham, & Cunningham, 1995), limited research has been conducted to examine the effectiveness of such an approach on the language and literacy success of children with LLD. A small number of recently published studies have specifically examined the effectiveness of multiple-linguistic spelling word-study treatment. Although findings appear positive for the use of such an approach, the value of these studies is limited because they either offer only qualitative evidence without any statistical supporting evidence (Darch, Kim, Johnson, & James, 2000; Williams & Hufnagel, 2005; Williams & Philips-Birdsong, 2006) or they are published in edited publications, such as books (Apel, Masterson, & Hart, 2004; Berninger et al., 2003; Wolter, 2005). The purpose of this brief is to provide a systematic review of the recent peer-reviewed quantitative research that focuses on language and literacy outcomes in school-age children using a multiple-linguistic spelling instructional approach. Following this review is a discussion of how these review results would be applied to an evidence-based practice (EBP) decision-making process by the school SLP who is providing Tim’s intervention program.

**Method**

**Formulating the Clinical Question**

The first step in the systematic review process is to formulate a clinical question focusing on a multiple-linguistic word-study treatment approach. The research question for the present brief is: Does a multiple-linguistic word-study spelling intervention approach improve written language success for school-age children with and without LLD?

**Inclusion Criteria**

An initial general search in an electronic database of the research on a multiple-linguistic word-study instruction revealed limited treatment research with a focus on all linguistic areas (phonological awareness, orthographic knowledge, and morphological awareness), and thus the following inclusionary criteria were used as a way to include an adequate amount of research with a focus on the specified research question:

- Studies were included if word-study spelling instruction was focused on one or more linguistic variables (phonological awareness, orthographic knowledge, or morphological awareness).
- Given the limited available research, a decision was made to include children with LLD, as well as typical children.
- Case studies, single-group, or single-subject designs in addition to the preferred quasi-experimental or experimental randomized control trials were included.
- Only quantitative research was chosen as a way to discuss statistically related findings (practical significance and/or statistical significance) across all research.
- Study outcomes needed to extend beyond spelling achievement and include those of other language literacy factors such as reading decoding, reading comprehension, reading-word recognition, and/or writing.
- Only research was chosen that included school-aged participants whose first language was English.
- All research needed to be published in a peer-reviewed journal within the last 10 years.

**Article Search**

An initial search was conducted using the Educational Resources Information Center (ERIC), Professional Development Collection, Psychology and Behavioral Sciences, Social Sciences, Teacher Reference Center, and PsycInfo. The search terms included the keywords “spelling instruction” or “word study” combined with the keywords...
of “language,” “phonological awareness,” “orthographic knowledge,” or “morphological awareness.” This search was followed by a similar search on the American Speech Language Hearing (http://www.asha.org) website, as well as the What Works Clearinghouse (http://ies.ed.gov/ncee/wwc/). The search of all databases resulted in identification of 2,026 citations. A hand search also was conducted in which the reference lists were reviewed in relevant articles, research, and systematic reviews on spelling (Reed, 2008; Wanzek, Vaughn, Wexler, Swanson, Edmonds, & Kim, 2006). Articles were excluded from the review if their abstracts and/or titles indicated that they did not meet all of the inclusionary criteria.

Following the complete search, 56 full-text articles were retrieved and reviewed. The content of each of these articles was skimmed and it was determined that 43 of the 56 articles failed to meet one or more of the inclusionary criteria. The 13 remaining studies were included for the present review (see Table 1). Listed studies are organized according to the levels of evidence from the American Speech Language Hearing Association’s (2006) standards, with randomized controlled trials being the highest level of evidence.

**Research Quality**

The methodological quality of the included studies was assessed and systematically appraised according to eight attributes that are associated with high-quality research (Gillam & Gillam, 2006). (See Table 2.) These attributes helped to substantiate that the research findings were due to the experimental treatment and not some other factor(s) (e.g., control group differences, random assignment to groups). The following quality-appraisal attributes were used to assess the quality of the studies retrieved and included in this review:

- Use of a comparison control group(s) or treatment group(s)
- Random participant assignment to treatment or control group(s)
- Limited differences or variance between the control and treatment group(s) for a clear statistical comparison
- Sufficient information regarding the participant sample, which would allow a clinician to adequately determine whether a client matched the description of the participant sample and/or replicate the study
- Inclusion of reliable and valid outcome measures to ensure the researchers consistently and accurately measured what they purported to measure
- Use of blind examiners (individuals who conduct assessments or analyze data without knowledge of the participant treatment group)
- Inclusion of comparison statistics and effect sizes to allow the researcher(s) to quantify the probability that the results were due to at least a 5% chance ($p < .05$)
- Inclusion of effect sizes to interpret practical clinical significance on a 0 to 1.0 plus scale. Effect sizes can indicate little clinical significance (0.2), moderate clinical significance (0.5), or large clinical significance (0.8).

Although researchers have yet to reliably determine how to weight these quality judgments, we can take a summative assessment approach in that the more quality-appraisal attributes included in a study, the more we can trust that the research was replicable, reliable, valid, and generalizable.

In our review for Tim, we can surmise that the randomized controlled trials have the most quality-appraisal points and provide the most reliable and generalizable of evidence, compared to the case studies with the least amount of appraisal points. Although the results from 13 case studies are applicable to Tim given the participant similarities to his specific case, we need to verify the case study findings with results of control trials with and without randomization that include a larger number of participants with varied abilities and that control for bias through measures such as blinded evaluators.

**Research Integration**

With the 13 included studies in hand, the following literacy outcomes of a multiple-linguistic word-study approach were reported.

**Reading and Spelling Outcomes**

For those studies in which reading and spelling were both outcome variables, multiple-linguistic word-study spelling treatments resulted in increased word-level reading recognition, decoding, and/or spelling abilities for children with and without LLD (Abbott & Berninger, 1999; Apel & Masterson, 2001; Berninger et al., 1998, 1999, 2002, 2008; Blachman et al., 1999; Kelman & Apel, 2004).
A commonality across the studies was the inclusion of the linguistic factors of phonemic awareness and orthographic knowledge in explicit word-study spelling activities. Phonemic awareness activities linked to spellings and orthographic knowledge word-sorts appeared to facilitate children's literacy development. For example, phonemic segmenting activities linked to orthographic spellings were found to increase the word-level reading and/or spelling abilities in children ages 10, 11, and 13 with language-literacy deficits (Apel & Masterson, 2001; Kelman & Apel, 2004; Masterson & Crede, 1999). These case study findings were further supported by randomized controlled studies in which treatment comparisons were made. Berninger et al. (1999) examined phonemic blending activities linked to orthographic knowledge and found that activities that focused on matching phonemes to specific letters (/p/ matched to the letter p) or letter combinations (e.g., /sl/ matched to the letters ee; /sl/ matched to the letters sl) were more effective in increasing scores for reading-word recognition than phonemic blending activities that focused on matching blended phonemes to whole words (e.g., /sl/-/l/-/i/-/p/ blended to /slip/ to the written word sleep) for first-grade children with reading deficits. Moreover, when third-grade children with low writing scores (Berninger et al., 2002), and second-grade children in a different study with low spelling scores (Graham & Harris, 2005) were explicitly taught phoneme–orthographic correspondences (e.g., different ways to spell /kl/, /fl/, /zl/) and various orthographic rules (e.g., short- versus long-vowel rules), children in both studies performed significantly better on spelling and reading measures compared to control groups that did not receive linguistically based word-study spelling instruction.

The addition of a morphological awareness linguistic component also appeared to facilitate reading and spelling development. Morphological awareness instruction that focused on inflectional and derivational affixes, whether presented orally only or linked to written spellings, significantly improved seven- and eight-year-old children's spelling of morphologically based words compared to control groups that received phonological awareness instruction (phoneme manipulation, blending), and in some cases, an orthographic knowledge component (short- versus long-vowel spelling rules; Nunes et al., 2003). Nunes et al. (2003) found that children receiving any of the linguistically based treatments (morphological awareness orally, morphological awareness linked to spelling, phonological awareness orally, phonological awareness linked to spelling and orthographic knowledge) increased their reading and spelling abilities. Berninger et al. (2008) further supported the inclusion of morphological awareness with the finding that children with dyslexia in fourth to ninth grades receiving a morphological awareness spelling treatment improved in their ability to read and spell pseudowords, which indicated a generalization of spelling learning.

Additionally, studies by Vadasy et al. (2005) lend support to the use of all three linguistic components (phonological, orthographic, and morphological) for reading and spelling improvement in a word-study spelling instructional approach. In Study 1, which was conducted with second-grade children who had low average reading scores, the researchers found that a multiple-linguistic approach with an additional reading component in which children read words that reflected newly learned phonological, orthographic, or morphological spelling patterns significantly increased the reading skills of decoding, recognition, fluency, and comprehension, in addition to spelling abilities. Interestingly, a subsequent randomized study of second- and third-grade children who had low average reading scores resulted in strong effect sizes for reading decoding, recognition, and fluency only, without effects for spelling and reading comprehension. This discrepancy possibly could be explained by different grade-level needs in Studies 1 and 2. In Study 1, only second-grade children were included, whereas in Study 2, both second- and third-grade children were included. Given that the importance of morphological awareness in spelling accuracy surpasses that of orthographic knowledge in third grade (Green, McCutchen, Schwiebert, Quilan, Eva-Wood, & Juelis, 2003), possibly more morphologically based lessons were needed at the third-grade level to increase spelling and the morphologically related skill of reading comprehension.

**Writing Outcomes**

Linguistically based word-study spelling treatments appeared to be successful in increasing children's writing abilities (Berninger et al., 1998, 2002, 2008; Graham &
Harris, 2005; Nunes et al., 2003). When linguistically based instruction was linked to children’s writings and new spellings were practiced in written compositions, writing improved in children with language literacy deficits in second grade (Berninger et al., 1998) and fourth through ninth grade (Berninger et al., 2008), regardless of the type of linguistically based instruction used. Also noteworthy were studies in which writing improved following a linguistically based spelling treatment without a written composition component in third-grade children with low compositional writing skills (Berninger et al., 2002) and second-grade children with low spelling skills (Graham & Harris, 2005).

Implications for Tim

Along with careful consideration of the EBP components of research evidence, clinical expertise, and Tim’s individual needs, the research in the present review lends itself toward the use of a multiple-linguistic word-study approach for Tim. A systematic review of the research indicates that a multiple-linguistic spelling word-study remediation component in literacy intervention may be a useful linguistic addition that positively contributes toward young school-age children’s literacy progress. Specifically, the inclusion of the linguistic factors of phonemic awareness and orthographic knowledge in explicit word-study spelling activities appears to facilitate improved word-level reading decoding, recognition, and spelling abilities in young school-age children with and without LLD. Additionally, morphological awareness appears to benefit literacy development in children as young as second grade and as advanced as seventh grade; however, more research needs to be conducted in this area to replicate these findings. Thus, Tim appears to be an ideal candidate for language treatment with a multiple-linguistic word-study approach that focuses on the language links between phonological awareness (sounds) and orthographic knowledge (spellings). Moreover, given Tim’s difficulties in morphological awareness and his advanced elementary grade level, he may very likely benefit from an additional morphological awareness word-study focus. In addition, in order to aid in Tim’s literacy development, this multiple-linguistic word-study instruction should include opportunities to practice new linguistic strategies in a single-word reading and written context since the evidence suggests that school-age children’s writing and reading improves when linguistically based word-study spelling instruction is linked to written composition and reading practice.

References


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### Table 1. Descriptions and Outcomes of Research Studies

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<td><strong>Level Ib (Randomized Control Trial) and Level IIA (Controlled Without Randomization) Evidence (ASHA)</strong></td>
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<tr>
<td>Abbott &amp; Berninger (1999)</td>
<td>Randomized Control Trial</td>
<td>20 children Grades 4–7 Performed low average in reading</td>
<td>Treatment (Tx) Group: Explicit instruction of morphological awareness and structural analysis of syllables (Henry, 1990) Control Group: Study skills training Both groups received Tx in orthographic knowledge (spelling rules and phoneme-grapheme correspondences), phonological awareness (deletion), decoding (phoneme blending), and reading comprehension.</td>
<td>16 sessions, 1 hour duration, over a 4-month period Individual sessions</td>
<td>Spelling Writing Decoding Word ID Reading comprehension (RC) Phonological Awareness (PA) Orthographic Knowledge (OK)</td>
<td>Children in both treatment (Tx) and control groups significantly improved growth curve in all outcome areas. No significant differences were found on outcome measures between the control group and Tx group which may have been due to decreased power as a result of small group sample sizes and/or common shared Tx.</td>
</tr>
<tr>
<td>Berninger, Abbott, Zook, Ogier, Lemos-Britton, &amp; Brooksher (1999)</td>
<td>Randomized Control Trial</td>
<td>48 children Grade 1 Performed low average in decoding and/or recognition</td>
<td>Tx Groups: Whole Word Tx Word ID, phonological blending activities, matching the whole-word orthographic code to blended sounds Subword Tx Word ID and phonological blending activities, matching orthographic code of single/multi-letter units to sounds Combined Tx Whole word and subword Tx All Tx groups read connected text</td>
<td>8 sessions, 30 minutes duration, in the summer following 1st grade year, 1 session per week Individual sessions</td>
<td>Spelling Writing Decoding Word ID</td>
<td>Growth curve analysis revealed significant increases in word-level reading for all Tx groups, with the subword Tx resulting in the most effective Tx in word ID scores as measured by a significant interaction of Tx and time. Pre-Tx phonological awareness and orthographic knowledge scores predicted children's success in the all Tx.</td>
</tr>
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### Table 1., continued

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<tr>
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<tr>
<td>Blachman, Tangel, Ball, Black, &amp; McGraw (1999)</td>
<td>Controlled/ Not Randomized</td>
<td>128 children Grade 1 Tx (n = 66) Control (n = 66)</td>
<td>Continued longitudinal study in which Tx group received phonological awareness instruction (Blachman et al., 1994) Tx Group:  Phonemic awareness instruction linked to spelling, alphabetic code (orthographic knowledge), and decoding Control Group:  Traditional basal-reader program</td>
<td>30-minute daily instruction for first-grade school year. Class instruction</td>
<td>Spelling Decoding Word ID PA</td>
<td>The Tx group performed significantly better than control group on phonemic awareness, spelling, and reading measures.</td>
</tr>
<tr>
<td>Abbott (2001)</td>
<td>Controlled/ Not Randomized</td>
<td>16 children Grade 3 Tx Group (n = 8) Control: (n = 8)</td>
<td>Tx Group:  Orthographic knowledge focus word-study (Bear, Invernizzi, Templeton, &amp; Johnston, 1996) Control Group:  Traditional spelling Tx</td>
<td>45 minutes daily, 1 school-year. Class instruction</td>
<td>Spelling OK</td>
<td>Children receiving word-study spelling instruction with orthographic knowledge focus performed significantly better on orthographic knowledge spelling measures (ηp² = .39) (no confidence interval reported), and their spellings reflected more sophisticated orthographic spellings. No significant differences found between children’s abilities to produce low/high frequency word spellings.</td>
</tr>
</tbody>
</table>
### Berninger et al. (2002)

**Study Design:** Randomized Control Trial

**Sample Description:** 96 children Grade 3

**Intervention/Comparison:**
- **Tx Groups:** Spelling Only: Phonemic awareness and orthographic knowledge
- **Writing Composition Only**
- **Executive functioning, information/persuasive writing**
- **Combined Spelling and Writing**
- **Control:** Handwriting, keyboard training, composing practice

**Intensity/Duration/Groups:** 24 sessions, 20 minutes duration, over 4-month period

**Language Outcomes:** Spelling, Writing, Decoding

**Findings:** For all Tx groups children significantly improved spelling and writing abilities from pre- to post-test performance. Children in the spelling training only program performed significantly better on a decoding test than those children receiving the spelling with compositional writing component. Other performance areas were not significantly different.

### Nunes, Bryant, & Olsson (2003)

**Study Design:** Randomized Control Trial

**Sample Description:** 457 children 7- and 8-year-old children

**Intervention/Comparison:**
- **Tx Groups:** (n = 220)
  - Morphological Awareness Training Alone (oral only)
  - Segmenting, blending, manipulating affixes
  - Morphological Awareness with Spelling
  - Segmenting, blending, manipulating affixes with base words linked to spelling
  - Phonological Awareness Training
  - Alone (oral only)
  - Segmenting, blending, and manipulating phonemes
  - Phonological Awareness with Spelling
  - Linking phoneme segmenting, blending, and manipulating to spelling rules (orthographic knowledge)
- **Control Group:** (n = 237)
  - No additional small-group training

**Intensity/Duration/Groups:** 12 sessions, weekly

**Language Outcomes:** Spelling, Writing, Decoding, Word ID, Morphological Awareness (MA)

**Findings:** For all intervention groups, children performed significantly better than controls on standardized reading measures. For both morphological awareness Tx groups, children performed significantly better than controls on morphologically-based spelling measures, although no significant differences found between groups on morphologically-based reading measures. No significant differences found between groups on orthographic knowledge-spelling and reading.
### Table 1., continued

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<td><strong>Graham &amp; Harris (2005)</strong></td>
<td>Randomized Control Trial</td>
<td>60 children Grade 2 Low average spelling</td>
<td>Tx Group: Orthographic knowledge activities with spelling word sorts Control: Math lessons</td>
<td>48 sessions, 20 minutes duration, 3 times a week, for 16 weeks Small-group instruction (2 students)</td>
<td>Spelling Writing Decoding</td>
<td>Tx group outperformed control group on spelling measures immediately (effect sizes range = .66 to 1.05), and 6-months post-Tx (effect sizes range = .70 to 1.07) Tx group outperformed control group on writing (effect size = .78) and decoding (effect size = .82)</td>
</tr>
<tr>
<td><strong>Vadasy, Sanders, &amp; Peyton (2005)</strong></td>
<td>Study 1: Controlled/ Not Randomized</td>
<td>Study 1: 31 children Grade 2 Low average reading scores</td>
<td>Study 1: Tx Group: (n = 10) Phonological awareness, orthographic knowledge, morphological awareness, and word ID linked to spelling of sight words. Oral readings which included words of multiple-linguistic linkages. Control: (n = 19) No additional tutoring</td>
<td>Study 1: (M = 42.2 hours) 30 minutes duration, 4 days/ week, 20 weeks Individual instruction</td>
<td>Study 1: Spelling Decoding Word ID Reading fluency RC</td>
<td>Study 1: Children in the Tx group significantly improved on a composite of decoding and recognition (d = .86), reading fluency (d = .82), reading comprehension (d = .75), and spelling (d = 1.06) compared to control group</td>
</tr>
<tr>
<td>Study 2: Randomized Control Trial</td>
<td>Study 2: 21 children Grade 2 (n = 6) Grade 3 (n = 15) Low average decoding</td>
<td>Study 2: Tx Group: (n = 11) Phonological awareness, orthographic knowledge, morphological awareness, and word ID linked to spelling of sight words. Oral readings which included words of multiple-linguistic linkages. Control: (n = 10) No additional tutoring</td>
<td>Study 2: (M = 36 hours) 30 minutes duration, 4 days/week, 20 weeks Individual instruction</td>
<td>Study 2: Spelling Decoding Word ID Reading fluency RC</td>
<td>Study 2: Children in the Tx group improved significantly more than the control group on a decoding and recognition composite (d = 1.06), reading fluency (d = 1.09). No significant differences were found between groups on reading comprehension (d = .32), and spelling (d = -.32).</td>
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### Table 1., continued

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<tr>
<td>Berninger, et al., (2008)</td>
<td>Randomized Control Trial</td>
<td>Study 1: Grades 4–6 (n = 22) Grades 7–9 (n = 17) Diagnosis Dyslexia</td>
<td>Study 1: Tx Groups: Orthographic Knowledge Spelling Tx (n = 20) Morphological Awareness Spelling Tx (n = 19) All Tx groups received writing composition instruction</td>
<td>Study 1: 14 sessions, 120 minutes duration, consecutive week days Small-group instruction</td>
<td>Study 1: Spelling Writing Decoding</td>
<td>Study 1: Children who received morphological awareness spelling Tx significantly improved the most on nonword spelling. Children who received orthographic knowledge spelling Tx improved significantly on real word spelling and decoding. All Tx groups significantly improved in spelling and writing.</td>
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<td></td>
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<td>Study 2: 24 children Grades 4–6 Diagnosis Dyslexia</td>
<td>Study 2: Language Tx Group (n = 12) Phoneme-grapheme correspondence -applied to decoding, spelling applied in writing, note taking strategies, computer-assisted report writing Nonverbal Control Tx Group: (n = 12) Computer-based problem-solving activities</td>
<td>Study 2: 4 small group sessions 180 minutes total Small-group instruction</td>
<td>Study 2: Spelling Writing Decoding</td>
<td>Study 2: Both Tx groups resulted in significantly improved nonword decoding, spelling, and written note-taking.</td>
</tr>
</tbody>
</table>

**Level III (Case Study) Evidence (ASHA)**

| Masterson & Crede (1999) | Case Study | 10.5-year-old male Grade 5 Diagnosed with learning disability | Phonemic Awareness Activities Phonemic segmenting and blending linked to corresponding spelling Orthographic Knowledge Activities Orthographic rule word sorts and focus on the mental graphemic representation of the words | 12 sessions, 60-minute duration, 6 weeks, bi-weekly. Individual sessions | Spelling Writing | Significant increases were found in spelling based on non-overlapping SEMs from pretest to post-test. Writing appeared to improve given increased post-Tx percentage of words correct in 4 of 5 writing samples. Inconsistent baselines and unknown reliability prevented effectiveness interpretation of these results. |

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<td>Apel &amp; Masterson</td>
<td>Case Study</td>
<td>13-year-old female Grade 8</td>
<td>Phonemic Awareness Activities:</td>
<td>15 sessions, 90 minute duration, daily, (23 hrs total)</td>
<td>Spelling, Writing, Decoding, Word ID</td>
<td>Large effect sizes found for the difference in spelling ability pre- and post-test (d = .84). Significant increases in decoding and word ID based on non-overlapping SEMs from pretest to post-test. Marked increases of phonemic awareness and morphological awareness skills pre-test to post-test.</td>
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<tr>
<td>(2001)</td>
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<td>Diagnosis ADD/ Language-Literacy Deficit</td>
<td>Phonemic segmentation with written links to spelling</td>
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<td>Continuous voicing of phonemes when blending words</td>
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<tr>
<td>Kelman &amp; Apel</td>
<td>Case Study</td>
<td>11-year-old female Grade 4</td>
<td>Tx Groups:</td>
<td>11 sessions, average session 60 minutes), over 8 weeks</td>
<td>Spelling, Writing, Decoding, Word ID</td>
<td>A multiple-linguistic spelling approach resulted in clinically significant increase in spelling abilities (d = .5). Word level decoding and ID skills markedly increased as measured by non-overlapping SEM.</td>
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<td>(2004)</td>
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Table 2. Assessment of Methodological Study Quality, Based on Criteria (Gillam & Gillam, 2006)

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<th>Study</th>
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<th>Blinding of evaluators</th>
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