A Speech-to-Print approach to teaching reading

In this article **Dr Jan Wasowicz** argues that there are important differences to be considered between a 'speech-to-print' approach to literacy instruction and teaching that is based on 'print-to-speech'. In Part 1 she explains what is generally meant by a 'speech-to-print' approach to teaching synthetic phonics, with particular reference to the underlying design of *SPELL-Links™ to Reading and Writing*. Part 2 provides some practical examples of how a speech-to-print approach might be implemented.

Part 1: Speech-to-Print: The 'what' and the 'why'

Speech-to-print as an instructional method of teaching word-level spelling and reading is not new (Herron, 1995; McGuinness et al., 1996; Lindamood & Lindamood, 1998; Moats, 2000; Kelman & Apel, 2004). In recent years, however, this method of instruction and intervention has been more widely implemented as education professionals become more aware of this approach, and also become more tuned in to the behavioral and brain imaging research which reveal the close integration of the oral language, reading and writing systems. A strong research base is accumulating, too, that supports speech-to-print as an evidence-based method of teaching word-level reading and spelling (e.g., Roberts & Meiring, 2006; Wolter, 2009; James & Englehart, 2012; James et al., 2015; Conrad et al., 2019).

There are some notable differences among speech-to-print approaches and related commercial programs, although they share a common focus on spelling instruction as a gateway to improving both spelling and reading skills. An examination of their commonalities and differences is outside the scope of this paper, which, instead, explains general principles of a speech-to-print approach, then gives specific examples of how it might be implemented based on the research of Kenn Apel and Julie Masterson (among many others) and featured in the *SPELL-Links* program (Wasowicz et al., 2004).

What is meant by speech-to-print?

Very simply defined, speech-to-print refers to the process of mapping from phoneme to grapheme to spell (encode) the spoken word in written form. This is sometimes referred to as phonological encoding. A speech-to-print approach starts with a focus on the spoken word and moves from that starting point to the written word.

It is important to dispel the misconception that speech-to-print as an instructional approach is merely about teaching students how to spell words. It is much more than that. Speech-to-print instruction is the closely coordinated teaching of word-level reading *and* spelling in a manner that includes abundant orthographic mapping in the direction of phoneme

to grapheme. Very importantly, this makes it consistent with the biological wiring and organization of the brain for oral language (Pinker, 1997). Ideally, if learning is to be maximized, speech-to-print instruction also includes simultaneous activation and integration of all language systems and modalities (Berninger, 2000). The approach, too, involves a focus on procedural and statistical learning of the interconnected sound-letter-meaning codes, with relatively less focus on declarative knowledge (Seidenberg, 2017).

The rationale of speech-to print: Who moved my socks?

To understand the nuances of speech-to-print as an instructional approach for teaching word-level reading and spelling, we need to begin in utero. As humans, we are biologically wired for oral language, for listening and speaking, but not for reading and spelling (written language). Think about it. No one had to sit us down or send us to school to teach us how to understand words spoken to us and for us to learn how to talk and express our ideas. We simply needed to be immersed in the spoken language of our social environment for the developmental processes of speech and language to unfold.

From birth to five years of age is a period of rapid speech and language development, and by the time young children walk through the doors on the first day of school, their phonological systems (the oral language systems which allow them to recognize and speak all the sounds of the language spoken in their environment) are completely or nearly completely developed. Moreover, assuming that they speak the same language, all students who show up on that first day of school have approximately the same phonological system. Why is this important? You will understand once we talk about your sock drawer. Yes, your sock drawer.

Think about how you organize the socks in your sock drawer. Or the teaching materials in your room. Or the files on your computer. Now, think about how you would feel and how well you would function if, while you are reading this article, someone goes into your sock drawer (or into your teaching materials, or into those files on your computer) and rearranges everything. They arrange your socks in a very well-organized

manner; it's just that their system of organization is different from yours. How would you feel – confused? upset? lost? How well would you function? Would you have to fumble around, and would it take you longer to get dressed in the morning?

When students arrive at school on their very first day, they all come with the same sock drawer: a well-organised phonological system. With a speech-to-print approach, we begin reading and writing instruction there – with the phonology of their oral language system. A speech-to-print approach *first* teaches students to become aware of the phonemes of their language (that is, on the smallest parts of words that differentiate meaning) and then teaches them how to represent those phonemes with letters to write the words they say (phoneme-to-grapheme mapping, encoding).

In contrast, a print-to-speech approach introduces a sock drawer that may be well-organized, but that has a different organising principle. A print-to-speech approach begins by teaching students a whole new system – a man-made system of orthography based on letters, not sounds. In a print-to-speech approach, that is, reading instruction begins with letters, and students read the words they see (grapheme-to-phoneme mapping, decoding). A small percentage of students will easily adapt to learn the new (orthographic) system of organization, but many students will struggle, some more and for a longer time than others, to navigate their way around the new sock drawer. They will fumble, and some may never adapt very well to using this new, man-made system.

Speech-to-print instruction, therefore, is about leveraging the biological organization and sensitivity of the brain for phonological units of words (spoken language) to facilitate students' learning to read and spell words (written language). Spoken language is the gateway through which students learn to spell and read. This means that students engage in the spelling process (speech-to-print) first. But speech-to-print instruction is not only about spelling words, and it does not replace reading instruction. Instead, speech-to-print instruction uses a different system of organization to teach *both* spelling and reading.

There are several differences between speech-to-print instruction and more traditional print-to-speech instruction. This article will take

examples of these differences from five areas of literacy instruction, with Part 1 explaining what the differences are, and Part 2 providing examples of how a speech-to-print approach might be implemented. The five areas that will be discussed are:

- Phonemes and phonological awareness
- Orthographic mapping
- Sight words and irregular words
- Organisation and sequencing of instruction
- Syllable types, syllable divisions and spelling rules

Phonemes and phonological awareness

Although we are biologically wired for oral language and our phonological processing systems develop automatically during those early childhood years, direct and explicit instruction is almost always needed to develop a conscious awareness of the phonological structure of words. Phonological awareness (PA) is a metalinguistic skill: it's the ability to consciously analyze, identify, and manipulate (i.e., segment, blend, delete, add, substitute, sequence) the phonological components of spoken words, including spoken phonemes and spoken syllables. The critical role of phonological awareness instruction and skill is well-established (National Reading Panel, 2000).

Students who are receiving speech-to-print instruction will learn to analyze spoken words to identify the phonemes of their oral language system. For example, the word *max* has four phonemes: /m/-/æ/-/k/-/s/ and the word *match* has three: /m/-/æ/-/tʃ/. This is the way the brain is organized, and this is the way a speech-to-print approach teaches phonemes and develops phoneme awareness.

Print-to-speech programs often teach phonemes differently. In print-to-speech approaches, phonemes are taught in isolation, and are presented to students as sounds associated with graphemes, rather than as segments of spoken words. It's a different system; another sock drawer. It doesn't leverage what a student already has in place to facilitate student learning. Interestingly, this starting point in practice sometimes leads to errors in phoneme analysis — for example, students may be taught that the letter X represents one phoneme; or schwa sounds may not be explained

clearly, with students being taught that the ER in the words *herd* and *mother* sound the same.

Orthographic mapping and orthographic learning

The phonological encoding involved in spelling instruction in a speech-to-print approach has a powerful impact on orthographic learning. To understand this power of speech-to-print instruction, it helps to understand how orthographic learning occurs.

Orthographic learning occurs through the process of orthographic mapping, which is the process of connecting the sounds of spoken words with the letters that represent those sounds in the written form of words. Orthographic learning occurs both during the decoding of words (Share, 1999; 2008) and the encoding of words (Conrad et al., 2019). However, orthographic learning is greater during the spelling of words than during the reading of words (Conrad et al, 2019; Roberts & Meiring, 2006). There is greater transfer of orthographic learning from encoding instruction to the decoding of the same words than from decoding instruction to the spelling of the same words. Moreover, spelling instruction yields complete transfer of orthographic knowledge to the spelling of new words, whereas decoding instruction yields only partial transfer of orthographic knowledge to the reading of new words. Compared with decoding, spelling also leads to more robust, more durable word-specific representations in long-term memory. These word-specific representations, also called mental graphemic representations (MGRs) and mental orthographic images (MOIs) (Apel, 2009), support automatic, fluent reading and writing (Ehri, 2005; Perfetti, 2007; Kilpatrick, 2015). Interestingly, orthographic mapping has also been shown to facilitate vocabulary learning (Miles & Ehri, 2019; Rosenthal & Ehri, 2008).

A speech-to-print instructional approach leverages what is known from the research to facilitate orthographic learning: it *begins* with orthographic mapping in the direction of mapping from spoken phonemes/rhymes/syllables to their corresponding graphemes (i.e., speech-to-print). Students increase their attention to the phonological structure of words, receive explicit instruction in segmenting a spoken word into its individual phonological units, and engage in

repeated orthographic mapping from speech to print as they say the sounds and spell the words, always connecting the spoken and written words with their meanings. Within the same lesson, they also receive instruction and practice with orthographic mapping from the written form of the word to the spoken word as they decode/read words.

Speech-to-print reading instruction supports careful attention to the orthographic detail of the full word. There is no 'guess-and-go reading', i.e., guessing at a word based on the first or last letter(s) of the word or partial letter sequences within a word. Ideally, it also maximizes the amount of time students read out loud (vs. silently) to ensure that students fully engage the phonological system during the reading process. Even when reading silently, students may be instructed to pronounce unfamiliar words out loud to activate their phonological system and maximize orthographic mapping and orthographic learning (Rosenthal & Ehri, 2011.)

Conversely, in a print-to-speech approach, orthographic mapping takes place *first* in the direction of mapping from graphemes to phonemes (i.e., decoding); depending on the print-to-speech approach being used, there may be little or no inclusion of orthographic mapping from phoneme to grapheme within the same lesson, or at all.

Sight words and irregularly spelled words

'Sight words' are not the memorization of a string of letters. Orthographic mapping is required to build sight words. To become a sight word, the spelling (letters) of the word must be fully connected to the word's pronunciation (sounds) and meaning in memory (Ehri, 2014). When this word-specific representation of a word is fully developed and robustly stored in memory, the word is automatically, accurately recognized when reading, and automatically, accurately spelled when writing. The term 'sight word' is not accurately descriptive of the underlying processes involved, and is often misinterpreted and misused, leading to instruction that is not highly effective.

All words of the lexicon must become 'sight words', whether or not there are irregularities in their spelling. Reading and writing efficiency is achieved when complete, robust MGRs are stored in long term memory to be instantly activated during reading and writing. The length of time and

the number of meaningful encounters with a word that are needed before the word becomes completely and robustly stored in long-term memory depend on the word's frequency of occurrence in print (i.e., how many times an individual will encounter the written form of the word) and the regularity of the word's spelling. The less frequently a word appears in text (e.g., LAMPOON vs. SAT) and the more irregular its spelling (e.g., LAUGH vs. CAT), the more time and the greater number of encounters will be needed (Apel, et al., 2006; Henbest & Apel, 2018). However, as explained above, some encounters with a word are more impactful than others, and this is another reason why a speech-to-print approach is particularly beneficial for achieving reading and writing efficiency.

In a speech-to-print approach, a significant amount of instructional time is spent spelling (writing) words in a way that simultaneously engages all systems of language (Berninger, 2015) to facilitate word-level spelling *and* reading. As students segment and spell a word in context (i.e., with meaning), they must carefully attend to and simultaneously engage and integrate the phonological, orthographic, and semantic/morphological systems and codes to establish a robust MGR for the word. The process of encoding requires simultaneous attention to the phonological and orthographic codes; saying and writing the word additionally involves motor planning and adds motor memory to the learning process.

In contrast, in a print-to-speech approach, a significant amount of instructional time is spent decoding (reading) words. *If* proper decoding instruction is provided and *if* appropriate decoding is consistently used by students when they encounter an unfamiliar word, they will fully decode a word (no guess-and-go), thereby integrating the phonological, orthographic, and semantic/ morphological systems and codes to develop an MGR for the word. However, as previously discussed, spelling (vs. decoding) words leads to more robust MGRs for words. Moreover, many students, especially students with strong oral language skills, can correctly read all the words in a passage without fully decoding all the words.

Print-to-speech programs commonly teach words with uncommon spellings separately, not linked to the phoneme (phonological code) that contains the irregular orthographic code. They are often called 'red words', 'outlaws' or 'heart words', as well as 'sight words.' They often are taught through flash cards drills and brute memorization of the spelling of the word without direct phoneme-grapheme mapping, and sometimes without connection with the word's meaning.

In contrast, a speech-to-print approach typically includes irregularly spelled words (words with uncommon spellings of a phoneme) within that phoneme's lesson alongside teaching regular sound-letter correspondences for the target sound. For example, the word *any* in which the short vowel /e/ sound is spelled with the letter A may be included in the short vowel 'E' sound lesson. This organization of instruction by sounds vs. letters is consistent with the biological organization of the brain for phonemes (no new sock drawer) and links the phonological and orthographic codes. Whether the spelling is regular or irregular, students learn to pay attention to the phonological structure of the word and map from phoneme to grapheme (speech-to-print), copying from the correct spelling of the word, to fully connect the spelling of a word with its sounds as well as with its meaning. Students receive explicit instruction and additional repeated encounters with those words containing uncommon spellings to establish robust MGRs for reading and to support the use of established MGRs for spelling.

Organization and Sequencing of Instruction

The organization of lessons and the sequencing of instructional activities impacts student learning and how well students retain what has been learned (Van Patten et al., 1986). The International Dyslexia Association (2016) argues that structured literacy instruction requires that the material presented should follow the logical order of language, beginning with the easiest and most basic concepts and progressing systematically to more difficult materials. Of course, there are many factors to take into consideration when developing a scope and sequence, especially when one considers that the reading and spelling of words is a dynamic interplay of multiple linguistic, cognitive, and sensory/motor processes. A speech- to-print instructional approach is ideally guided by research conducted across multiple disciplines regarding the development of *spoken and* written language skills. Although it leverages the biological wiring of the brain for *oral* language, it sequences instruction with consideration of aspects of *both* oral language and written language.

One example of this is observed in the beginning lessons of a speech-to- print approach: early consonants are introduced and taught in a sequence based on features of the *spoken* letter name because these phonetic features facilitate learning to spell and read words (Treiman, 1993; Ehri & Wilce, 1985; Foulin, 2005). For this reason, the sequence of beginning spelling and reading instruction in a speech- to-print approach begins with words containing consonant letters in which the corresponding sound is heard at the beginning of the letter name (e.g., *pot*; easiest), proceeding to words containing letters in which the corresponding sound is heard at the end of the letter name (e.g., *men*; less easy), and finally to with words containing letters in which the corresponding sound is not heard in the letter name (*wag*; more difficult.)

In contrast, many print-to-speech programs introduce and sequence instruction for beginning consonants based on the visual features of the written letter, typically introducing visually dissimilar consonant letters in the same lesson and visually similar letters in different lessons, thereby not taking advantage of the natural tendency for students to use letter-name strategy in their early writing of words.

Going beyond early consonant instruction, a speech-to-print instructional sequence unfolds with consideration given to the development of *spoken and* written language skills. For example, when teaching students to segment words into phonemes, words in which the vowel is *not* followed by the letters R, L, M, N, NG or NK are introduced first because it is easier to segment vowel phonemes when they are *not* followed by the phonemes / r, l, m, n, ŋ / in the spoken word. Similarly, / s / clusters are taught before / r, l /clusters which, in turn, are taught before / m, n, ng / clusters because the segmentation of consonant clusters becomes more challenging across these phoneme groups (Treiman, 1993; Werfel & Scheule, 2012).

Across all lessons for spelling and reading single morpheme words (i.e., words that do not contain a prefix or suffix), the lessons frequently center around a single phoneme; in this way, a speech-to-print approach organizes the learning of sound-symbol associations in the same way the brain is already

organized (that biological sock drawer). Students first identify a sound and then learn the allowable spelling choices (orthographic representations) for that sound.

Syllable types, syllable divisions and spelling rules

The teaching of syllable types, spelling rules, and syllable divisions is yet another example of how a speech-to-print approach organizes reading and spelling instruction differently from a print-to-speech approach.

In a print-to-speech approach, syllable types, spelling rules, and syllable divisions are taught based on rules involving letter patterns. While declarative knowledge about syllable division and spelling rules can be helpful, at least for some students, there is research evidence that calls into question whether teaching memorization and application of these rules is a *necessary* and *most efficient* method of instruction. At least one study (Bhattacharya & Ehri; 2014) indicates that it is not, and instead supports flexibility with division of syllables as long as the vowels are assigned to separate syllables.

In a speech-to-print approach, by contrast, students do learn syllable types, spelling rules, and syllable divisions, *but these are not taught based on letter patterns (someone else's sock drawer)*. In a speech-to-print approach, students learn syllable types and spelling rules in a speech-to-print direction. They learn about open and closed syllables as they occur in speech (i.e., a closed syllable is a *spoken* syllable that ends with one or more consonant *sounds*). With some exceptions, they learn spelling rules by learning to pay attention *first* to the phonological structure of the word and then to how the phonological structure of the spoken word determines orthographic patterns in the written word (e.g., when I hear a long vowel sound in a closed syllable, the long vowel sound is almost always spelled with two vowel letters; when I hear "ch" at the end of a one-syllable word and "ch" immediately follows a short vowel sound, "ch" is almost always spelled with the letters TCH). As the student progresses to spelling multi-syllabic words, words are divided into syllables as naturally spoken (e.g., ca-bin vs. cab-in) and spoken syllables are mapped to their corresponding letters; the focus is on forming complete connections between

the sounds and the letters of each spoken syllable (Ehri, 1992).

With less instructional time spent memorizing declarative knowledge, a speech-to-print approach focuses more instructional minutes on procedural learning and explicitly teaching alternative strategies to support reading and spelling of words, including 'set for variability'. Set for variability in this context is a form of linguistic problem solving, involving the ability to derive an approximate pronunciation for a printed word and then use context and lexical knowledge to correct an incorrect pronunciation (Venezky, 1999; Tunmer & Chapman, 2012). After decoding a word, students learn to attend to the phonological structure of the misread word and to apply alternative pronunciations of consonant and vowel letters and 'flex' syllable stress i.e., move the stress from one syllable to another (all advanced phonological awareness skills) to correct an incorrectly decoded word (Savage et. al. 2018).

Additionally, students spend ample time engaged with pattern-loaded and authentic text to support application and practice of their newly learned knowledge, skills, and strategies. Increasing the amount of time students are engaged with authentic text provides opportunities for statistical learning (Seidenberg 2107), the process by which readers learn by implicitly tracking statistical regularities in language, including the mappings between orthography and phonology. Several studies have documented the orthographic learning that takes place during exposure to authentic text (e.g., Apel, et al., 2006; Savage et. al 2018).

Part 2: The 'how': Implementing a speech-to-print approach

This section provides practical examples of how a speech-to-print approach might be implemented in the five areas of literacy instruction discussed in Part 1. Note that all the word study activities specified here ideally also include a semantic element as an essential component of the speech-to-print approach, with the student saying the word being studied, then using it in a spoken sentence.

Phonemes and phonological awareness

Ideally, in speech-to-print instruction, phonological awareness (PA) activities are a part of all reading/word study lessons. Instead of teaching PA as an isolated skill, PA is linked to and integrated with the reading and writing of words. In this manner, students simultaneously engage the phonological (sound), orthographic (letter), and semantic/morphological (meaning) processes involved in word-level reading and spelling. Importantly, PA activities are included across all grade levels to ensure that students develop the more advanced PA skills they will need to support their reading and spelling of words with increasingly complex phonological structures as they advance through the grades.

Before delivering phonemic awareness instruction, teachers should practice the correct pronunciation of each spoken phoneme (e.g., /p/ not "puh"), to ensure that correct pronunciation is modelled for students (e.g., General American English *https://www.spell-links.com/resources-pronunciationchart/*; Australian English phonemes are modelled here: *https://www.spelfabet.com.au/2015/05/what-are-the-44-sounds-of-english/*.

Teachers should support students, as needed, to correctly say the sounds of words as they encode or decode a word. Teachers should become familiar with articulatory *and* acoustic phonetics (speech production *and* speech perception) of the language of instruction (and the student's native language/dialect, if different) to better understand why a student may struggle, and to effectively support and move students from less challenging to more challenging words.

One common misconception when speech-to-print approaches are discussed is that students need to be taught *how* the different speech sounds are produced. With rare exceptions, we don't need to teach students about how sounds are produced. Students come to school already equipped with implicitly knowing how to say the sounds of the language or languages that they speak. It is important, therefore, to keep it simple. For example, instead of spending time feeling the throat and talking about vibration of vocal folds and introducing terms like voiced vs. voiceless, teachers can normally simply model the sound and say (for example), "/p/ is a whisper sound". All children know

what whispering is, and 99.9% of the time that's the only prompt they need. Done. Onward. To be clear, spelling and reading are *language* skills; teaching isolated speech sounds with focus on their sensory and motor attributes is not teaching language.

In a speech-to-print approach, PA skill development should be connected with the reading and writing of words in both encoding (spelling) and decoding (reading) practice and can be embedded within word study and vocabulary learning across all grade levels.

To work on encoding:

- After saying the word in a sentence, the student repeats the word and then sounds it out, one phoneme (or syllable) at a time, drawing one horizontal line as he or she says each sound/syllable.

- Display the written word and ask the student to sound it out again, one phoneme/syllable at a time and to copy the letter(s) that match the spoken phoneme/syllable onto the drawn lines as he or she says each sound/syllable.

- The student then says the word slowly and points to the letter or letters in the written word that represent each sound that is being spoken, checking to be sure that each sound in the spoken word is represented by at least one letter in the written word and that the sequence of letters in the written word match the sequence of the sounds 'coming out of the mouth'.

To work on decoding:

- Display a printed word and explain, if necessary, that the letters on the page represent the sounds of the word.

- Tell the student to place a finger under the first letter.

- Instruct the student to slowly read the word aloud, sliding their finger from left to right as they blend one sound into the next (no pauses between sounds).

- Tell the student to repeat the word naturally and then use it in a spoken sentence.

Orthographic mapping and orthographic learning

Orthographic mapping activities should be used within word study and vocabulary learning across all grade levels. Teach mapping of phonemes and rhymes at the single word level;

introduce mapping of syllables as students move into multi-syllabic words.

- Begin instruction with orthographic mapping activities in the direction of speech-to-print (encoding/spelling words) and maximize the number of instructional minutes spent spelling words.

- Within the same lessons, coordinate spelling instruction with orthographic mapping activities in the direction of print-to-speech (decoding/reading words).

- Direct students to always say words out loud (during instruction *and* during authentic writing) as they write the corresponding words on paper, making sure they slide from one sound into the next without pausing between and simultaneously write the letter(s) that match the sounds 'coming out of the mouth' to tightly integrate phoneme-grapheme connections.

- Maximize the amount of time students read out loud in school and at home.

- Eliminate guess-and-go reading.

- Teach students to pronounce unfamiliar words out loud when reading silently.

Sight words and irregularly spelled words

Remember that all words should become 'sight' words as students learn to read, and that attention to spelling promotes the development of accurate mental graphemic representations (MGRs).

- Maximize the amount of time students spend learning to spell words and writing in general.

- Use phoneme-to-grapheme mapping for spelling words that contain both regular and irregular spellings of a phoneme, but provide additional practice with phoneme-grapheme mapping for the words that contain irregular spellings.

- Create a sound wall (see Fig. 1) to support student's spelling of words that contain uncommon spellings. A sound wall displays images representing the phonemes of a language (e.g., a picture of a hat represents /h/). Under each keyword picture, display spelling and vocabulary words that contain an uncommon/less common spelling of the phoneme (e.g., display the word WHO under the picture of the hat). When words are organized by sounds instead of letters, students can use what they already know—the sounds of a spoken word—to locate what they may not know—the spelling of certain sounds in a word.

- Make the sound wall a dynamic part of word study instruction and encourage students to use the sound wall to support their correct spelling of words during any writing task. Direct students to say the sounds of a word out loud as they *simultaneously* copy the corresponding letters from the word displayed on the sound wall to spell the word.

- Explicitly teach students across all grade levels how to develop orthographic representations of words (MGRs) when learning new
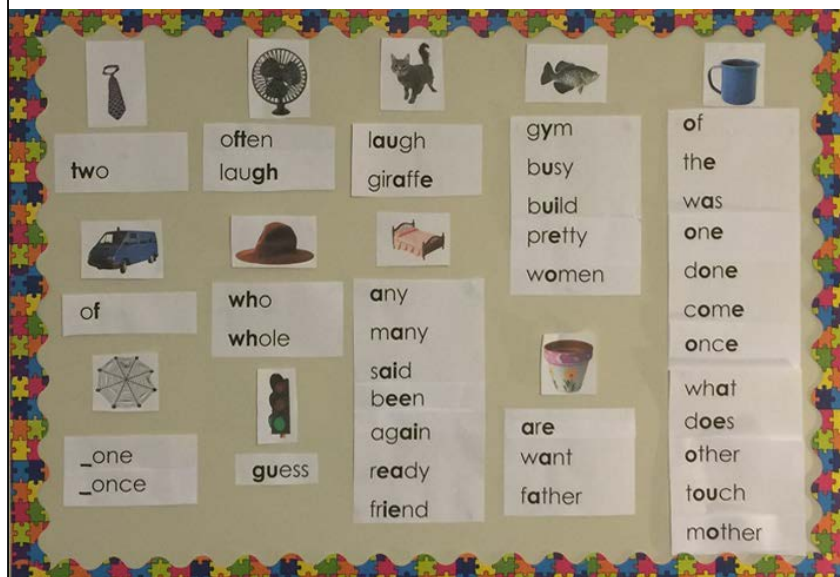

Figure 1. Sound wall

vocabulary words that contain spellings that do not conform to the common phonological, orthographic, and morphological patterns of the language.

- Explicitly teach students across all grade levels how to use their own MGRs to correctly spell a word that contains an irregular spelling. Sample activity:

  – After considering options to use spelling rules and/or word meaning to correctly spell the unfamiliar part of a word, instruct students to complete the spelling of the word using an allowable spelling for the corresponding sound. If their spelling of the word gives them a "yellow light" or a "red light" (i.e., it looks funny), tell the students to try different allowable spellings (alternative spellings of the sound), each time rewriting the word until they get a "green light" (i.e., the word looks correct).

- Spelling practice: Ensure that the student says the word in a sentence before and again after practising its spelling. Use the following steps for practising spelling:

  1 Trace: Softly sound out the word while simultaneously tracing the corresponding letters on writing paper provided.

  2 Copy: Softly sound out the word again while simultaneously copying the corresponding letters directly below on the next line of the writing paper.

  3 Cover: Cover the copied words with a note card and softly sound out the word once more while simultaneously writing the letters of the word on the next line of the writing paper; then uncover the word to check the spelling.

  4 Close eyes: After carefully examining the spelling of the word and positioning your pencil on the next line of your writing paper, close both eyes and softly sound out the word one more time while simultaneously writing the letters of the word; then open both eyes and check the word's spelling.

Organisation and sequencing of instruction

Teachers and practitioners should always establish the phonological structure of words and integrate this

structure into the lesson, regardless of spelling pattern and grade level.

- Leverage letter-name spelling when teaching beginning consonant sounds.

- Organize spelling and reading lessons around a phoneme or group of related phonemes and follow a sequence of instruction that moves from phonemes and phonological units that are most simple to analyze and manipulate to those that are more complex.

- When teaching words that contain prefixes and/or suffixes and word roots, organize spelling and reading lessons by first teaching written morphemes that have a morphological counterpart in oral language, i.e., prefixes and suffixes (e.g., un-, -ed) that combine with a free morpheme (a word, for example *lock*, to spell *unlocked*) and later introduce written morphemes that do not have a morphological counterpart in oral language: bound morphemes (e.g., vis-) that combine with other morphemes (e.g., in-, -ible) to form a word (invisible).

Syllable types, syllable divisions and spelling rules

Teachers and practitioners should become familiar with open and closed syllables in *spoken* language. As a rule of thumb, most spoken syllables in English end with a vowel sound. It is also important to become familiar with letter patterns and spelling rules based on the phonological structure of a word One comprehensive resource is the *SPELL-Links Word Study Resource* – see *https://learningbydesign.com*.

Allow students to segment words into syllables as occurs naturally when speaking. Be flexible; what's most important when mapping sounds to letters is to be sure the student writes the letters that correspond to the sounds of the syllables as spoken in order to form sound-letter connections between spoken and written words.

Sample activities for working on syllables while encoding (spelling):

- After students have said the word and used it in a spoken sentence, instruct them to repeat the word and to write the number of syllables in the spoken word on their paper. If they do not correctly identify the number of syllables, direct them to place their fingers under the chin to

feel the chin lower as each syllable is said.

- Show the written word to the students and tell them to repeat the word, saying one syllable at a time and simultaneously copying the letter(s) that correspond to the sounds 'coming out of the mouth'.

- When finished, tell students to check their spelling of the word to verify that each spoken syllable is represented by at least one vowel letter.

Sample activities for working on syllables while decoding (reading):

- Direct the student's attention to the 'vowel chunks' (i.e., the one or more vowel letters in each syllable of the written word).

- Tell the student to point to each vowel chunk while reading the word syllable by syllable, blending one spoken syllable into the next without pausing, and continuing until their finger has moved across all the syllables of the word.

- Tell the student to repeat the word naturally once it has been decoded in this way.

- Set for variability: Explicitly teach 'flexing' of consonant sounds, vowel sounds, and syllable stress and encourage the application of flexing when decoding. For example, if a student misreads CABIN with a long vowel *a* sound in the first syllable, ask them if they recognize the word as read. Next, direct the student's attention to the phonological structure of the word as read: "Listen to the vowel sound in the first syllable. Did you use a long or a short vowel sound?". Then, tell the student to re-read the word, flexing the vowel sound from long to short, to see if flexing results in pronunciation of a recognized word.

Once students begin reading and spelling words that contain prefixes and suffixes, explicitly teach them how to combine morphological analysis and knowledge with their phonological and orthographic knowledge and skills to support efficient reading and spelling of more complex words.

Conclusions

In summary, a collective body of behavioral and brain-imaging research has led to speech-to-print instruction being more widely implemented in classrooms and in intervention services as an evidence-based alternative to more traditional approaches for

teaching word-level reading. Student outcomes in reading and writing can be maximized by an approach to instruction that leverages the organization of the brain for oral language by emphasising phoneme-to-grapheme orthographic mapping, simultaneous activation and integration of all language systems and modalities, and procedural and statistical learning. Teachers and practitioners now understand that speech-to-print instruction is much more than spelling instruction – it is a powerful form of *reading* instruction, and it can be argued that there are many advantages of speech-to-print over print-to-speech instruction for improving both reading and writing performance.

In closing, I invite the reader to reflect on a simple question the next time they teach word-level reading and spelling: Whose sock drawer are we in?

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Dr. Jan Wasowicz is a speech-language pathologist with ASHA board certification as a specialist in child language. She is the inventor of the original Earobics® software, and is the hard-working moderator of the very active listserv, SpellTalk, described on its sign-up page as a free listserv discussion group for researchers, educators, and other professionals dedicated to improving literacy through discussion of research and evidence-based best practices https://mailman.listserve.com/listmanager/listinfo/spelltalk. When not busy changing the world of literacy, Jan enjoys spending time with friends and her 'child', a Goffin's cockatoo named Little Miss.

Disclosure: Dr Jan Wasowicz is founder and CEO of Learning by Design, Inc., publishers of SPELL-Links to Reading and Writing.

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