Tutorial

Morphological Knowledge: Opportunities for Collaboration Through Multitiered System of Supports

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Purpose: The study of morphological knowledge and its role in literacy development for early elementary students is growing. The aim of this tutorial is to illustrate the role a school-based speech-language pathologist (SLP) has as a collaborative partner in multitiered system of supports (MTSS) in elementary for morphological knowledge.
Method: This tutorial presents the role of morphology in the English writing system and the documented benefit of morphological interventions to support students' oral and written language development. Next, the role of morphology in literacy development as it appears in curricular standards is highlighted. Lastly, strategies are provided for how SLPs

can be part of a collaborative educational team to increase morphological knowledge in early elementary school within an MTSS framework.
Conclusion: Given school-based SLPs' language and literacy expertise, we are well suited for engaging in collaborative partnerships in the school setting to increase academic outcomes. The information presented in this tutorial provides a guide to establish collaborative partnerships within educational teams to support morphological knowledge development through all MTSS tiers. Additionally, the need for further evidence to support the role of morphological knowledge in literacy development is presented.

School-based speech-language pathologists (SLPs) are encouraged to work with interprofessional team members whose academic backgrounds vary (e.g., general and special education teachers, literacy coaches, caregivers) to provide language and literacy knowledge needed to support students' academic advancement (Meaux & Norris, 2018). Specifically, school-based SLPs' responsibilities range from assessing and providing treatment for multiple communication deficits (e.g., developmental language disorders, reading and writing difficulties, speech sound disorders) to using a variety of service provision models (e.g., pullout, collaborative practice). Given that a large proportion of students with oral language disorders demonstrate subsequent challenges with literacy (Catts, 1993; Catts et al., 2008), instruction that addresses both oral and written language skills at once can have a greater

impact. Morphology is one aspect of language that appears in several curricular standards, for example, English Language Arts: Foundational Skills and Language in the Common Core State Standards (CCSS, 2011). These standards offer numerous opportunities for SLPs to work as a collaborative team member to ensure that all students receive high-quality morphological instruction. In this tutorial, the authors will discuss the role of morphology in the English writing system and the documented benefit of morphological interventions on students' oral and written language, highlight where morphology appears in curricular standards, and present ideas for how SLPs may work collaboratively to implement morphological interventions in a multitiered system of supports (MTSS) across grade levels.

Morphological Knowledge and Literacy

Morphology is the study of word formation (i.e., bases combined with other bases and/or affixes), with each base or affix considered a meaningful unit (i.e., morpheme; Nagy et al., 2014). When one consciously considers or manipulates words into their smallest units of meaningful parts (i.e., bases and affixes), it is said that he or she is demonstrating morphological awareness (Nagy et al., 2014). In contrast, morphological processing, which, according to its definition, does not require the same conscious

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manipulation or reflection on morphology, as it is evident in young children's overgeneralizations of morphological rules (e.g., marking past tense by adding /t/, /d/, or /ɛd/ to spoken words, as in *goed*; Nagy et al., 2014). Nagy et al. (2014) propose that the intersection between morphological awareness and morphological processing is referred to as morphological knowledge.

In spoken language, we may hear and say words without giving conscious thought to those words' morphological elements (i.e., we engage in morphological processing). For example, upon hearing or producing the word "decide," one may not realize the presence of the "de" prefix and, instead, think of the entire word as a single unit of meaning. The same process may occur when learning the pronunciations and meanings of new words like "decibel," "deck," and "design"—and may occur without reflecting on the similarities or differences in the morphological structures of words. However, a deeper understanding of how morphology is represented in written English (i.e., using one's morphological knowledge and awareness) is helpful when learning how to read and spell words such as these. English is morphophonemic, meaning that it represents both morphology and phonology within spellings; however, morphology is a central organizing element of written language (Chomsky, 1970; Rastle, 2019; Venezky, 1999). Because of this, the morphological structure of a word dictates which graphemes may be used to spell which phonemes. Although there are some surface-level similarities in the pronunciation and spelling of ⟨decide, decibel, deck, design⟩, an investigation of morphological structure reveals why the words are spelled the way they are. The written word ⟨decide⟩ uses the grapheme ⟨c⟩ rather than ⟨s⟩ to represent the phoneme /s/—thereby preserving the base element ⟨cide⟩. The word ⟨design⟩ contains the same ⟨*de–*⟩ prefix as ⟨decide⟩ but uses ⟨s⟩ to represent /z/, as its base element is ⟨sign⟩. Other words may contain phonological similarities (e.g., ⟨c⟩ for /s/ in ⟨decibel, decide⟩) yet differ in morphological structure (⟨*deci–*⟩ vs. ⟨*de–*⟩ as prefixes). In contrast, words may contain surface-level spelling similarities yet differ in pronunciation (e.g. /dɛsaɪd/ vs. /dɛk/ in ⟨decide, deck⟩). An understanding of the spelling of morphological structures, their meanings, and the realization that pronunciations can change over time—yet meaning and spelling are less resistant to change—provides one with "clues" to the meaning and spelling of words, especially complex and rare words that occur more frequently in written language. Indeed, morphological awareness and knowledge provide insight into word formation processes and encourage an explicit analysis of words' spelling and meaning. This knowledge and awareness extend beyond a set of common prefixes and suffixes and also include knowledge of bases and compound words.

The importance of morphological knowledge in the development of oral and written language skills has recently received increased research attention, most notably being the topic of several meta-analyses (e.g., Goodwin & Ahn, 2013) and systematic reviews (e.g., Bowers et al., 2010). Goodwin and Ahn (2010) investigated 30 studies with morphological interventions for students who were enrolled in preschool through Grade 12 and found morphological instruction resulted in significant growth in students' morphological knowledge, as well as within other language and literacy skills (i.e., phonological awareness, vocabulary, decoding, spelling). Similarly, other research teams have reported that morphological instruction is just as effective, if not more effective, for less-able or at-risk students (e.g., students from low socioeconomic backgrounds, students with disabilities) than for typically developing students (Goodwin & Ahn, 2010) and may result in the greatest growth for younger students (Bowers et al., 2010; Carlisle, 2010; Goodwin & Ahn, 2013). Given the multifaceted effect that morphological instruction may have on students' language and literacy skills, early morphological instruction may serve a preventative role for those at risk for language and literacy disorders, as well as an instructional need for those students who already display symptoms of a language or literacy disorder.

Morphology Within Curricular Standards

The CCSS, adopted by most states, provide classroom teachers with a clear set of expectations that guide instructional decisions for what students are expected to learn at each grade and guide learning outcomes. Teachers use the CCSS to develop classroom curricula. The CCSS include references to morphologically related concepts across multiple grade levels and English language arts strands, including reading, writing, speaking and listening, and language. Recently, Gabig and Zaretsky (2013) published a detailed list of the specific CCSS that reference morphology across all grade levels. However, in this tutorial, we provide suggestions to target morphological intervention in three distinct grade levels (i.e., kindergarten, second grade, and fourth grade). For each of these grade levels, the morphologically based concepts represented in the CCSS increase in complexity to support reading acquisition and comprehension (see Table 1).

Early morphology instruction has resulted in increases in morphological awareness and literacy skills of young students (e.g., Apel et al., 2013; Bowers et al., 2010; Goodwin & Ahn, 2010). During kindergarten, foundational skills for reading acquisition and comprehension (e.g., phonological awareness, orthographic knowledge) are taught through systematic and explicit instruction as supported in the CCSS strand for Vocabulary Acquisition and Use (CCSS. ELA-LITEARCY.L.K.4). However, interventions in kindergarten that target only one of these skills (e.g., alphabetic code, not phonological awareness) are not as effective as interventions including both components (Ball & Blachman, 1988; Bradley & Bryant, 1983; Cunningham, 1990; Shapiro & Solity, 2008) and tend to produce smaller gains in student outcomes (e.g., Kilpatrick, 2015). As students move into second grade, the explicit, systematic, and simultaneous instruction of phonological and orthographic awareness, in conjunction with morphological awareness instruction and intervention, is beneficial to

Table 1. Specific Common Core State Standards related to morphological knowledge at kindergarten, second grade, and fourth grade.

English Language Arts Standards	Kindergarten	Second	Fourth
➔ Reading: Foundational Skills K-5 Phonics and Word Recognition		Know and apply grade-level phonics and word analysis skills in decoding words (CCSS.ELA-LITERACY.RF.2.3). d. Decode words with common prefixes and suffixes (CCSS.ELA-LITERACY.RF.2.3.D).	Know and apply grade-level phonics and word analysis skills in decoding words (CCSS.ELA-LITERACY.RF.4.3). a. Use combined knowledge of all letter–sound correspondences, syllabication patterns, and morphology (e.g., roots and affixes) to read accurately unfamiliar multisyllabic words in context and out of context (CCSS.ELA-LITERACY.RF.4.3.A).
➔ Language K-5 Vocabulary Acquisition and Use	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *kindergarten reading and content* (CCSS.ELA-LITEARCY.L.K.4). b. Uses the most frequently occurring inflections and affixes (*–ed, –s,* re–, *un–, pre–, –ful, –less*) as a clue to meaning of an unknown word (CCSS. ELA-LITERACY. L.K.4.B).	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *Grade 2 reading and content,* choosing flexibility from an array of strategies (CCSS.ELA-LITERACY.L.2.4). b. Determine the meaning of the new word formed when a known prefix is added to a known word (e.g., *happy/ unhappy, tell/re-tell*) (CCSS. ELA-LITERACY.L.2.4.B). c. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *addition/additional*) (CCSS.ELA-LITERACY.L.2.4.C). d. Use knowledge of the meaning of individual words to predict the meaning of compound words (e.g., *birdhouse, lighthouse, housefly; bookshelf, notebooks, bookmark*) (CCSS.ELA-LITERACY. L.2.4.D).	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *Grade 4 reading and content,* choosing flexibility from an array of strategies (CCSS.ELA-LITERACY. L.4.4). b. Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., *telegraph, photograph, autograph*) (CCSS.ELA-LITERACY.L.4.4.B).

reading acquisition (see Wolter & Dilworth, 2014). The second-grade CCSS Phonics and Word Recognition strand (CCSS.ELA-LITERACY.RF.2.3) describes morphological knowledge as a tool or strategy that can be used when attempting to determine the meaning of an unknown, poly-morphemic word (e.g., "use a known root word as a clue to the meaning of an unknown word with the same root [e.g., *addition/additional*]"). Furthermore, morphological knowledge continues to develop across the upper elementary years (Nagy et al., 2006) and beyond (Nagy & Scott, 2000; Tyler & Nagy, 1989), as reading becomes a more complex task. As reading demands increase in upper grades with the simultaneous coordination of multiple linguistic skills, the CCSS strands also increase in complexity (e.g., CCSS. ELA-LITERACY.RF.4.3). Resources exist that describe how SLPs may work collaboratively with others to support students with communication disorders or those who are at risk for academic difficulties (e.g., students participating in MTSS interventions; Gabig & Zaretsky, 2013). Yet, no tutorial, to our knowledge, has presented recommendations for high-quality, interprofessional collaboration to promote students' morphological abilities in oral and written language with an MTSS framework.

School-Based Collaborations for Morphology Instruction

Adapted from the World Health Organization, the American Speech-Language-Hearing Association (ASHA, n.d.-a) defines interprofessional practice (IPP) as two or more professionals working together to achieve common goals and is frequently used as a means for solving a variety of problems and complex issues. According to Blosser (2016), educators and SLPs can collaborate to provide outcomes-based, educationally relevant services through IPP. Moreover, school-based collaborations ensure students achieve their highest potential (Blosser, 2016).

Given SLPs' knowledge of language structures, we may be ideal candidates to collaborate with members of school-based teams to provide morphological intervention to students across multiple grades and ability levels, as well as provide focused professional development on morphology to educators. This idea of providing training to both teachers and students highlights our role in prevention (i.e., providing general education teachers with the tools they need to provide high-quality classroom instruction) and intervention (i.e., providing children identified with communication disorders high-quality special education services). One of the core competencies for IPP is knowledge of one's own role and those of other professions to appropriately assess and address the needs of students. Actually, collaboration with teachers and other school professionals is specifically noted as a responsibility of school-based SLPs (ASHA, 2010). More recently, school-based SLPs have also been encouraged to provide services in the least restrictive environment, within the classroom context (ASHA, 2010; Meaux & Norris, 2018). As such, a collaboration between

SLPs and other school professionals is described as essential for effective service delivery (ASHA, 2010). Additionally, while school-based SLPs have primarily limited services to assessment and intervention in the past, there is an increasing emphasis on prevention of school failure through extending services to at-risk students. MTSS provides an excellent framework for SLPs and teachers to work collaboratively within the classroom to prevent academic failure for all students.

The MTSS framework has three tiers of support, with (a) the first tier consisting of high-quality, whole classroom instruction; (b) the second tier providing smaller group, specialized interventions; and (c) the third tier reserved for those students who require individualized, intensive intervention—thereby requiring special education services, such as those provided by an SLP (Blosser & Means, 2020). It is important to note that SLPs may work collaboratively as members of an interprofessional team at "all" tiers of supports. Additionally, different school- and state-level policies may describe an MTSS structure that is different than what is presented here (e.g., Tier 3 not yet representing special education services; see Mellard et al., 2010). Therefore, the authors encourage readers to review additional information on MTSS models (e.g., ASHA n.d.-b) to assess how collaborations can be established in their schools within their MTSS framework. In this tutorial, we provide examples based on Blosser and Means's (2020) explanation of MTSS while exploring morphological interventions through school-based collaborations.

Knowledge of Morphological Instruction

Educators who possess a greater understanding of morphology may be better suited to provide explicit morphological instruction. The CCSS detailing morphological knowledge (see Table 1) require that teachers not only understand commonly used morphological terms and topics (e.g., affixes, bases, compound words, orthographic shifts) but also know how to effectively teach this content. Ideally, morphological instruction would be in an integrated (as opposed to isolated) activity in which the meaning, pronunciation, and spelling of a word are discussed (Bowers et al., 2010) within the context of morphological families (Nagy & Anderson, 1984). Therefore, educators will likely require knowledge of morphological content "and" morphology pedagogy to provide explicit, high-quality morphological instruction. In order for our collaboration to be most effective, we need to further understand the morphological training that SLPs and teachers receive and how this training may result in a shared set of terminology and skills. In addition, our time and efforts spent on focused professional development will increase educators' ability to implement high-quality morphological interventions and align curricular content to the CCSS.

A recent literature search yielded that researchers have investigated (mostly preservice) teachers' morphological content knowledge and SLPs' morphological pedagogical practices (Good, 2019). The findings from several

researcher-developed surveys suggest that teachers often lack an explicit understanding of morphology and, as such, incorrectly answer survey items assessing their morphological knowledge (e.g., Moats & Foorman, 2003; Washburn & Mulcahy, 2018; Washburn et al., 2011). Moreover, evidence suggests that teachers increase their morphological knowledge as they gain teaching experience, with in-service teachers slightly outperforming preservice teachers (Aro & Björn, 2016). Furthermore, increased morphological knowledge is also possible for those who receive explicit training on metalinguistic abilities (Purvis et al., 2016; but see Henbest et al., 2019).

For example, Purvis et al. (2016) demonstrated that it is possible to promote growth in educators' morphological knowledge through a short, 90-min training. This training, which was part of a longer 7-hr training on phonological awareness and orthographic knowledge, provided instruction on the differences between free morphemes and bound morphemes (including both inflectional and derivational morphemes), morphological analysis (i.e., segmenting polymorphemic words into separate morphemes), morphological recognition (i.e., identifying the bases and affixes), and understanding orthographic shifts that occur with the addition of an affix (e.g., ⟨y⟩/⟨i⟩ change in beauty/ + ful ➔ ⟨beautiful⟩). Although this training was delivered over two sessions, an SLP may prefer to deliver this content during a single session, followed by ongoing coaching or consultation services during active learning opportunities within the classroom, as this model is also an evidence-based practice for professional development (Garet et al., 2001).

Recently, Henbest et al. (2019) extended the work of Purvis and colleagues to investigate the impact of teacher training on students' morphological knowledge by implementing a single training session, followed by ongoing coaching. Specifically, Henbest and colleagues assessed two second-grade teachers' morphological knowledge before teachers watched a 2-hr online training at their leisure. The teachers then implemented the morphological intervention (as described in Apel et al., 2013) for 8 weeks while also receiving consultation and feedback from an SLP once a week (i.e., an SLP routinely observed their lessons for approximately 10–20 min). Although neither teacher improved her morphological knowledge from pre- to posttest as measured by performance on three morphological knowledge tasks, their students appeared to benefit from the intervention. Students increased their scores across all morphology assessments. The authors concluded that "teachers did not have to become 'experts' in morphological awareness to be effective in teaching their students to think about morphology" (p. 7)—a finding that is reassuring for SLPs who wish to facilitate focused professional development, assist in the alignment of curricular content with the CCSS, and monitor learning and teaching.

However, as research that outlines SLP/educator morphological training programs remains in its infancy, it is beyond the scope of the current tutorial to describe the critical content and experiences that should be included in focused professional development activities on the topic of morphology. Despite the dearth of current evidence, we believe that this tutorial will allow SLPs and educators to better understand the morphological terms and concepts outlined in the CCSS, thereby enhancing their morphological content and pedagogical knowledge, and is an important first step to highlight the need for further research in this area. To assist in dialogue between teachers and SLPs, a list of morphological terms and concepts is provided in Table 2 and could be reviewed by SLPs prior to developing any focused professional development.

Morphology Interventions Through MTSS Collaborations

Multiple studies have found morphological instruction to have a positive impact on students' overall literacy skills; however, there is considerable variability across these interventions in terms of the content that is taught and the instructional methods used to teach this content. Indeed, in a past special issue about morphology, Nagy et al. (2014) concluded that additional research focused on the design of effective morphological interventions is needed. That being said, the findings from meta-analyses and systematic reviews indicate that, even with substantial variability in what researchers consider to constitute a morphological intervention, students respond positively to intervention and increase metalinguistic skills, word-level reading skills, and reading comprehension (e.g., Goodwin & Ahn, 2013).

In terms of content, morphological intervention may be provided in isolation (i.e., working on morphology by itself) or in an integrated fashion (i.e., teaching morphology within the context of other language and literacy skills); the latter approach to instruction, often contextualized in literacy activities, is related to increased growth in student performance (Bowers et al., 2010). Several activities may also be used, in either approach, to enhance students' morphological knowledge. Intervention commonly begins with an introduction to the concept of word families (i.e., words that share the same base, ⟨act, acted, react⟩), with interventionists encouraging children to be word Detectives who are constantly on the lookout for words that share meaning and morphemic structure. In order for an SLP to understand which specific activities that they may wish to incorporate in morphological intervention and/or train other educators to implement, they may use the procedures described within individual studies (e.g., Wolter & Green, 2013) or review tutorial articles that provide summaries of commonly used treatment activities (e.g., Apel & Werfel, 2014; Goodwin et al., 2012; Wolter & Collins, 2017). Furthermore, within the current forum, Murphy and Diehm (2020) provide a review of commonly used intervention activities, as well as provide sample scripts and visual supports that could be used within each activity. In the sections that follow, we present examples of morphological intervention activities, aligned with the CCSS, that SLPs and other school-based professionals could implement to develop students' morphological knowledge in kindergarten, second grade, and fourth grade within an MTSS

Table 2. Common morphological terms and concepts.

Morphological feature	Definition or relevant content	Example(s)
Content knowledge		
Morpheme	The smallest unit of meaning within a language. Morphemes may be a base or an affix.	
Bases	A morpheme (or pair of morphemes) that carries the primary meaning of a given word. A free base may "stand alone" and have meaning (i.e., monomorphemic word), while a bound base must be paired with another base or affix (and as such is a polymorphemic word). Rather than using the term "base," the CCSS commonly use the term "root." Linguistically speaking, these two terms are not interchangeable, with the root referring to the historical spelling of the morpheme and the base used in reference to its present-day English spelling. However, the terms "bound base" and "root" will be used interchangeably in this tutorial to reflect the terminology used in the CCSS.	Free base: Act Bound base: ⟨struct⟩ in structure
Affixes	A morpheme whose meaning is realized after it combines with a base or other affixes. By itself, an affix (prefix or suffix) is not a word, nor does it carry meaning.	
Prefixes	An affix that attaches to the beginning of a word to adjust or qualify meaning of the resulting polymorphemic word.	*Dis–*, *re–*
Suffixes	An affix that attaches to the end of a word to adjust or qualify meaning of the resulting polymorphemic word.	*–ly*, *–er*
Inflectional morpheme	A suffix that provides information about the time or quantity of the word, without changing the word's meaning. Inflectional suffixes often preserve the part of speech of the base (e.g., a verb will stay a verb); however, this is not always the case. Inflectional morphemes tend to develop early in children's language (Brown, 1973) and include morphemes that mark plurality (e.g., ⟨–s⟩ or ⟨–es⟩), past tense and past participles (e.g., ⟨–ed⟩ or ⟨–d⟩), present participles (⟨–ing⟩), singular third-person present tense verbs (⟨–s⟩ or ⟨–es⟩), comparatives (e.g., ⟨–er⟩), superlatives (e.g., ⟨–est⟩), and possessives (e.g., ⟨–'s⟩).	Suffix to mark past tense: Jump ➔ Jump + ed Suffix to mark plurality: Dog ➔ Dog + s Suffix that changes a words' part of speech: Flow (verb) ➔ flow + ing (adjective); as in "The *flowing* water is peaceful."
Derivational morpheme	May be a prefix or a suffix. These morphemes change either the meaning of the word and/or its part of speech (e.g., verb to a noun). Knowledge of derivational morphemes continues to develop well into middle and high school (Anglin, 1993).	Prefix to change word meaning: fair ➔ un + fair Suffix to change part of speech: teach ➔ teach + er
Derivational transformations	When a derivational morpheme attaches to a base, a derivational transformation occurs. These transformations may consist of a transparent or opaque change to the pronunciation (i.e., phonological features) or spelling (i.e., orthographic features) of the base.	
Transparent transformations	The relationship of the base to a polymorphemic word within the same family is considered transparent when there is (1) no change in pronunciation or spelling to the base, (2) a change in the pronunciation of the base, or (3) a change to the spelling of the base.	1. ⟨friend⟩ ➔ ⟨friendly⟩ 2. ⟨magic⟩➔ ⟨magician⟩ 3. ⟨silly⟩ ➔ ⟨silliness⟩
Opaque transformation	The relationship of the base to a polymorphemic word within the same family is considered opaque when there is a change to both the pronunciation and spelling of the base.	Admit ➔ Admission
Word family	Words that share the same base and therefore essential meaning are part of the same word family. Words within a family may contain a variety of prefixes and suffixes. Note that this definition of a word family is different than what other educators may be familiar with—a group of words that all end in the same letter (e.g., the *–ack* family).	Act, Acts, Acted, Acting, Action, Actor, Active, Actively, Activity, Activate, Activator, Activation, Actable, Actability, Enact, React, Reaction, Reactive, Retroactive
Compound words	The result of two bases being joined together, from which new, but related meaning, is derived.	Firefly Mailman Carwash Schoolhouse

Note. CCSS = Common Core State Standards.

framework. Although we list specific morphological intervention strategies for specific tiers within the MTSS framework, it should be noted that no research has determined what a tiered morphological intervention may include. Therefore, each strategy listed below should be considered "dynamic" in that the strategy could be used (a) inside the classroom (e.g., Tier 1 or 2 instruction) or outside the classroom (e.g., Tier 3 intervention); (b) for whole group instruction (i.e., Tier1), small group instruction (i.e., Tier 2), or during individualized instruction (i.e., Tier 3); and (c) for the purposes of ongoing monitoring of learning and teaching.

Kindergarten Morphological Strategies

During the kindergarten year, morphological interventions have primarily targeted oral language skills, with intervention targets consisting of inflectional morphemes such as suffixes that indicate grammatical information (i.e., tense and number) and "frequently occurring" derivational affixes (e.g., Apel & Diehm, 2014; Apel et al., 2013). This type of intervention supports the CCSS for morphology in kindergarten (i.e., CCSS.ELA-LITEARCY.L.K.4), which states the use of most frequently occurring inflections and affixes to support the meaning of unknown words and multiple-meaning words and phrases. Strategies specific to support morphology development in kindergarteners are provided below by MTSS tiers.

Kindergarten Classroom-Based Collaboration

Children who enter kindergarten exhibiting language deficits in phonological awareness, letter–sound correspondences, and vocabulary knowledge may struggle with literacy skills in the years to come. Students in the early elementary grades benefit from morphological instruction, which, in terms of research conducted thus far, has started with teaching students to identify affixes. Specifically, the focus will be on auditory awareness, focused stimulation, and elicited production done in the context of children's books, songs, and play (Tyler et al., 2011). For awareness activities, the description of the morpheme is provided, and the child is asked to identify it from choices given (Tyler et al., 2011); for drill play, students use new skills in single words both in facilitated environments and spontaneous communicative situations (Tyler et al., 2011).

Classroom-Based Collaboration Strategy Tier 1: Thumbs Up Storybook Reading. To establish a clear and shared focus, it is recommended that the teacher and the SLP establish processes on which to collaborate on within Tier 1 instruction that aligns with kindergarten CCSS for morphology: "uses the most frequently occurring inflections and affixes (*–ed, –s, –un, –ful, –less*) as a clue to meaning of a word (CCSS.ELA-LITERACY.L.K.4.B)." This goal will drive the development and delivery of the Thumbs Up Storybook Reading strategy.

The purpose of Thumbs Up Storybook Reading is to provide an oral model of a polymorphemic word (i.e., base + inflectional suffix) in an environment that encourages movement and play. For kindergarten, this activity will be a combination of providing awareness through oral productions, coupled with supporting the literacy unit for the week. In this example, the kindergarten class will be exploring *We're Going on a Bear Hunt* (Rosen & Oxenbury, 1989). This book provides an opportunity to provide models of regular past tense verb construction during each episode of the family's journey. Additionally, this activity can be supported through action (e.g., movement, play). Taking inspiration from Tyler et al. (2011) and considering that many inflectional suffixes consist of a single phoneme in oral language (e.g., /s/ for marking regular plural nouns, /d/ or /t/ for marking regular past tense verbs), our Thumbs Up Storybook Reading activity will focus on phoneme detection, phoneme categorization, and phoneme isolation for the regular past tense construction.

During whole-group book reading (or small group instruction), the actions performed by the family each time they encounter a new obstacle on their journey will be emphasized. To begin, the facilitator will introduce the idea of past tense –ed for the Thumbs Up Storybook Reading activity by modeling what the family did when encountering an obstacle: "They *stopped*." The facilitator will explain to the group:

> Today we are going to do thumbs up reading! This means we are going to listen for words that have the /d/ and /t/ sound at the end to mean something already happened. When you hear these sounds that mean something happened in the past, give a thumbs up. Let's try one!

The facilitator will begin to read the book, adding commentary about the different actions the family took to find the bear (e.g., walked, swished, stumbled). When the first instance of one of these regular past tense verbs is read, the facilitator will prompt the students to give a thumbs up: "Did you hear it—'Walked'" with emphasis on the pronunciation of the inflectional suffix /t/. Moving along with the family, the students will be asked to act out each movement the family does during their adventure. For example, students will be encouraged to "swish" and "squash" when the family is moving through the grass. To encourage the past tense construction, the facilitator will ask the students, "What were you doing?!" The children will be prompted to respond: "We swished." To that response, the facilitator will give a thumbs up. This sequence will continue for each of the five subsequent obstacles the family approaches (and for a bonus, can be done again as the family is making their way back home).

Classroom-Based Small Group Strategy Tier 2: Word Construction Site. For students receiving Tier 2 instruction, a goal aligned with the CCSS for activities like Word Construction Site could be developed: "Students will orally provide the correct definition for words containing derivational morphemes (e.g., agent –er) and inflectional morphemes (e.g.,–ing, –ed, plural –s) with 70% accuracy by the end of the academic year." When SLPs facilitate group rotations demonstrating language instruction in the classroom, every team member on the educational team present at the time

(e.g., paraeducators, teachers) is provided a model for facilitating systematic language instruction.

The goal of creating a Word Construction Site is to provide practice opportunities for high-frequency prefixes, bases, and suffixes using word cards to generate polymorphemic words from individual, constituent morphemes (Goodwin et al., 2012). As such, Word Construction Sites are a good small group rotation for students to practice identifying a word, determining its meaning, and explaining how the meaning of the base relates to the meaning of newly formed, polymorphemic words (see Goodwin et al., 2012). Using high-frequency prefixes, bases, and suffixes to generate word meaning is a good start. Providing students with many multiple models of target structures in a natural environment (i.e., the classroom) further reinforces their exploration of polymorphemic constructions outside this facilitated activity.

During this in-class small group rotation, the facilitator (e.g., teacher, SLP) will describe the function of plural –s: "Today we are going to make new words. The new words will mean that there is more than one of something. Let's look at our book *The Very Hungry Caterpillar*" (Carle, 1969). The facilitator will point to one item in the book (e.g., an apple) and then show a picture with one apple on it or provide the students with an apple. Followed by the model: "The caterpillar ate an apple (point to the apple)." Next, the facilitator will provide students with several apples and then ask: "The next day he ate two ____."

Using the pictures in the book, this type of modeling followed by a cloze prompt may be done for each item of food the caterpillar eats. Additionally, if picture cards are used, it is advantageous to include the orthographic representation (i.e., written word) on the card. This activity would provide multiple oral models of the target structure and model the orthographic differences between the two words. This activity would also lend itself to introducing the idea of compound word. For example, the facilitator may describe a compound word (e.g., "Compound words are made up of two or more 'little' words that have meaning—but are then joined together to form a new word with a different meaning. Let's look in the book for examples of a compound word." The facilitator may then point out pictures of compound words (e.g., ice cream, watermelon, butterfly), along with their orthographic representations, to discuss the idea of open compounds (i.e., ice cream) versus closed compounds (i.e., watermelon, butterfly). The facilitator could allow students to generate new compound words for the caterpillar to eat (e.g., catfish, cupcake, blackberry, drumstick, meatball, popcorn) or could present pictures of two individual words (e.g., cup and cake) and ask the students to join the two words together to make a compound word. For example, "Here's a cup, and here's a cake. Let's put 'cup' and 'cake' together to make a compound word. This caterpillar ate a _____." Following the strategy of providing the correct plural morpheme or compound word construction, students will then be asked to define what this new construction means as illustrated in the following strategy.

Progress Monitoring Strategy Tier 3: Word Detectives. For the Word Detectives intervention strategy proposed below, the SLP is still an important member of the interprofessional team in that the SLP will be directly monitoring learning and communicating progress with the teacher and family. For Tier 3 intervention, several short-term objectives could be developed to support progress monitoring:

1. Given pictures representing a base word in singular form (e.g., *apple*) and pictures representing a base word plus plural suffix (e.g., *two apples*), the student will label the pictures with at least 90% accuracy (CCSS.ELA-LITERACY.L.K.4.B).

2. When presented with a sentence containing the prefix *re–* or the prefix *un–* added to a base word, the student will identify the picture that matches the sentence from a field of two choices by pointing to their answer with at least 90% accuracy (CCSS.ELA-LITERACY. L.K.4.B).

3. When read a story aloud, the student will identify an inflectional morpheme (e.g., past tense –ed) or compound word by making a "thumbs up" gesture in the story 15 out of 20 times (CCSS.ELA-LITERACY.L. K.4.B).

The goal of Word Detectives is to use clues in a word to identify the meaning of the whole word. For this activity, the prefixes *re–* and *un–* will be introduced by categorizing each of the prefixes and defining the new word using the kindergarten definition of the prefix in addition to the definition of the base word. For this individual (i.e., Tier 3) intervention, the game "I-spy" (Goodwin et al., 2012) will be facilitated with the student by providing a magnifying glass as a tangible means of highlighting the activity of investigating words (Apel & Diehm, 2014).

The SLP will provide the students with a sheet of paper with pictures and words containing the prefixes *re–* and *un–*, along with pictures illustrating the target words. To begin, the SLP will introduce both prefixes to the student using child-friendly definitions. For example, the student will learn that the prefix *un–* means "not" and the prefix *re–* can sometimes mean "to do again." Then, each of the pictured items (i.e., prefix + base word) will be defined by the child.

After exploring each of the pictures and words, the SLP will take the student around the school to "spy" words on the list. When the student "spies" a word, the student will orally (a) state the prefix, (b) provide the base word, and (c) define the resulting word.

Second-Grade Morphological Strategies

Compared to morphological interventions developed to improve younger students' oral language skills, second-grade students are commonly exposed to morphological instruction that includes a focus on how morphology is represented in both oral and written language, with interventionists teaching students to read, spell, and understand

the meaning of polymorphemic words (e.g., Apel & Diehm, 2014; Bowers & Kirby, 2010; Wolter & Green, 2013). Morphological interventions in second grade should continue to develop students' knowledge of how inflectional suffixes attach to base elements, as well as how compound words are formed (as described above) but should also incorporate explicit instruction on how derivational prefixes and suffixes attach to base elements. Without an explicit focus on derivational morphology in written language, students may struggle to read, spell, or understand the meanings of polymorphemic words. Polymorphemic words that may be especially challenging for students include words in which the base is (a) pronounced differently across members of a family (e.g., ⟨hind⟩ in *hinder* and *behind*), (b) spelled differently across members of a family (e.g., spelling of ⟨cure⟩ in *cure* and *curable*), or (c) pronounced and spelled differently across members of a family (e.g., ⟨cave⟩ in *caves* and *cavity*). Examples (a) and (b) are considered transparent, in that the pronunciation or spelling serves as a "clear" link between the two derived forms (albeit, still more challenging than transparent, derived words where both pronunciation and spelling are preserved across two members of a family [e.g., ⟨thank⟩ in *thankful* and *thanklessly*]). In contrast, example (c) would be considered opaque as the link between the two derived forms, due to changes in both pronunciation and spelling, is less obvious. Given the regular nature of these transparent and opaque modifications, the SLP may work as part of an interprofessional team to ensure that classroom instruction highlights how words can share meaning and structure despite changes in pronunciation and/or spelling. Explicit intervention on suffixing conventions (e.g., dropping the ⟨e⟩, or doubling final consonants, when adding a vowel suffix), spelling of base elements that undergo pronunciation changes (e.g., *heal* and *health*), and compound words (e.g., *health* and *healthcare*) would likely be included within this instruction. These activities would support students' mastery of the second-grade CCSS for vocabulary (i.e., CCSS.ELA-LITERACY.L.2.4.D), which states that students should "use knowledge of individual words to predict the meaning of compound words," and the CCSS for spelling (i.e., CCSS.ELA-LITERACY.L.2.2.D), which states that students should "generalize learned spelling patterns when writing words." Intervention activities associated with the second-grade CCSS will be addressed in the context of both oral and written language, encouraging students to listen to, say, read, and spell polymorphemic words. Learning about a word across these four modalities can occur within the context of a single intervention, as opposed to requiring separate interventions for each modality of language (i.e., listening, speaking, reading, spelling; Henry, 1997; Moats 2005). Teaching students how to encode (spell) words has been shown to have positive effects on students' word-level spelling and reading abilities (e.g., Graham & Hebert, 2010; Uhry & Shepherd, 1993), with additional studies highlighting the positive impact of addressing both decoding (reading) and encoding (spelling) simultaneously (Weiser & Mathes, 2011). As such, the activities described below

encourage MTSS team members to expose students to polymorphemic words, with the expectation that students will hear, read, and spell polymorphemic words in context.

Second-Grade Classroom-Based Collaboration

In order for Tier 1 instruction to reflect the needs of the students, the SLP could request student writing samples from the teacher or work collaboratively with the teacher to analyze students' errors in spelling polymorphemic words. For example, a member of the interprofessional team may discover that students spelled the plural suffix in several different ways, such as ⟨playts⟩ for ⟨plates⟩, ⟨kidz⟩ for ⟨kids⟩, and ⟨menyouz⟩ for ⟨menus⟩ and that students did not utilize their knowledge of the base word when attempting to spell related polymorphemic words (e.g., ⟨litehouse⟩ for ⟨lighthouse⟩). Additionally, educational teams may review the extent to which students incorporate commonly occurring affixes into their writing, such as ⟨dis–, in–/im–/il–/ir–, re–, un–, –ly⟩ (Honig et al., 2000). Based on a review of students' work, the team could develop a lesson or series of lessons to teach students about the meaning, pronunciation, and spelling rules for a specific learning target (e.g., marking plurality in spelling) or focus students' attention to the spelling of the base word when reading, spelling, or understanding the meaning of related polymorphemic words (e.g., writing compound words).

Several morphological intervention strategies would be appropriate to include in tiered instruction; however, Word Sorts, Word Sums, and Word Matrices are often used when teaching morphology within the context of written language. Furthermore, all three intervention strategies allow students to hypothesize about word structure and modify their hypotheses as needed based on feedback or analysis of new "evidence" at each level of MTSS. Despite the similarities among the techniques, Word Sorts are often used to teach students to pay attention to the meaning and spelling of an affix, rather than its pronunciation (e.g., regular plural nouns will be spelled using ⟨–s⟩ or ⟨–es⟩ despite hearing /s/, /z/, or /Iz/; Apel & Diehm, 2014; Kirk & Gillon, 2009; Wolter & Green, 2013). In contrast, Word Sums and Word Matrices are helpful morphological intervention tools to encourage students to consider their knowledge of a base word when spelling related, polymorphemic words (e.g., ⟨plate⟩ rather than ⟨play⟩ in ⟨plates⟩) and promote a richer understanding of the meaningful connections among members of a word family (Bowers & Kirby, 2010; Devonshire et al., 2013). Word Sums and Word Matrices are components of an orthographic intervention called Structured Word Inquiry (Bowers & Kirby, 2010), which has the primary purpose of teaching how the English writing system works. For a more complete description of how to present Word Sum and Word Matrices activities, see Murphy and Diehm's (2020) article within the current forum.

Classroom-Based Collaboration Strategies in Tier 1: Word Sorts. Often, the goal of a Word Sort activity is to increase students' awareness to orthographic patterns. The student is typically given a set of words (each printed on a

different piece of paper or note card) and encouraged to engage in self-discovery of a targeted orthographic regularity through the process of sorting words into groups. As a result of this self-discovery, students may verbalize the regularity or rule before the educator announces it, possibly writing the rule down in a journal or dedicated classroom wall or whiteboard to remember it. An example of a Word Sort is shown in Table 3, in which an interventionist would explain to the students that they were going to look at several words, all of which ended in the same ⟨–ed⟩ morpheme but sound different. After modeling how to sort at least one word from each category, the interventionist reads a card and encourages a student to put the card in the group where they think it belongs. For example, the interventionist may say, "Look. Here is another word that ends in ⟨–ed⟩. This word is *waited*—as in the sentence '*I waited for the bus for two hours.*' Think about the sound or sounds that you hear at the end of the word *waited* and decide in which column the word belongs." After the words have been sorted, the interventionist and students will analyze each pattern, attempting to come up with a hypothesis about why these pronunciation changes occur.

The purpose of the example Word Sort is to teach students that suffixes may be pronounced differently, yet they will always be spelled the same (e.g., ⟨–ed⟩ in this example). However, given that some of these words contained changes to the base spelling before the suffix was added, additional Word Sorts could be used. For example, to help students understand the spellings of (a) ⟨shared⟩, (b) ⟨stopped⟩, and (c) ⟨tried⟩, additional suffixing conventions will need to be taught. These suffixing conventions, numbered to align with the examples given, include (a) hiding the single final nonsyllabic ⟨e⟩, (b) doubling the final consonant of a base, and (c) changing ⟨y⟩ to ⟨i⟩ in the base. SLPs may wish to use the "Big Suffix Checker" flowchart (Ramsden, 2004) to facilitate a comprehensive and accurate understanding of these rules, which they may then share with other members of their interprofessional team.

In order to monitor students' progress and the effectiveness of the classroom intervention, perhaps the SLP and teacher decide that when reviewing curriculum-based writing samples, students will spell polymorphemic words that contain inflectional suffixes (i.e., *–ing, –ed, –s, –er, –est*) and derivational affixes (i.e., *dis–, in–/im–/il–/ir–, re–, un–,* and *–ly*) with 80% accuracy per affix. Should a student not meet the learning outcome for spelling a particular affix (and apply associated spelling rules, if any) after more

than 80% of their peers have reached mastery, the student would be provided with Tier 2 intervention within the MTSS framework.

Classroom-Based Small Group Strategy Tier 2: Word Sums. A student who did not meet the benchmark on a given spelling convention in Tier 1 would then receive supplemental, small group instruction as part of Tier 2 intervention. In order to provide additional practice with suffixing conventions or to use the spelling of a base in its derived form, Word Sums may be a helpful tool. Word Sums involve writing out the additive morphemes that one believes comprise a word (e.g., act + or ➔ actor; act + ion ➔ action), allowing for a visualization of the separable morphemes within each word. This process requires one to reflect on the meaning, spelling, and pronunciation of words within a family, as spelling and pronunciation changes may have occurred, yet the central meaning of all words in a family is preserved. Therefore, the purpose of a Word Sum is to develop a hypothesis about the morphological structure of a word to determine if a group of polymorphemic words are related (i.e., do all of these words share the same base element?). Going back to our example student spelling error of ⟨playts⟩ for ⟨plates⟩, examples of related Word Sums are shown in Table 4. Note that two of the Word Sums require knowledge of suffixing conventions (i.e., ⟨plated⟩ and ⟨plating⟩). These conventions would have previously been taught to students using the Word Sorts described above but could be reiterated within Tier 2 intervention if the student does still not reach criteria on spelling words that contain suffixing conventions.

In order to monitor a student's progress in Tier 2 and determine if adequate growth is being made, the student's weekly classroom writing samples will still be compared to the learning outcome mentioned in Tier 1, while also measuring the student's ability to decode words that contain commonly used affixes. During each small group session, the student will be given an opportunity to review a self-selected section of a text from the curriculum, pointing to three polymorphemic words that contain a target affix (i.e., *–ing, –ed, –s, –er, –est, dis–, in–/im–/il–/il–, un–, –ly*), decoding or pronouncing each word, and verbally saying the base of each word with 80% accuracy for each affix (CCSS. ELA-LITERACY.RF.2.3.D, CCSS.ELA-LITERACY. L.2.4.B). Similar to the decision-making cut-point described above, the team decided that, should a student still not meet the Tier 1 learning outcome for spelling a particular affix (and apply associated spelling rules, if any) after more than

Table 3. Example of Word Sort.

⟨–ed⟩ pronounced /t/	⟨–ed⟩ pronounced /d/	⟨–ed⟩ pronounced /əd/
helped	spilled	waited
jumped	shared	landed
looked	tried	pointed
watched	moved	needed
stopped	changed	included
walked	stayed	added

Table 4. Example of Word Sums for ⟨plate⟩.

Target word	Word Sum hypothesis	Interpretation of hypothesis: The resulting word is part of the ⟨plate⟩ word family.
plates	plate + s ➔ plates	Yes
plated	plat¢ + ed ➔ plated	Yes
plating	plat¢ + ing ➔ plating	Yes
nameplate	name + plate ➔ nameplate	Yes
contemplate	con + templ¢ + ate ➔ contemplate	No
plateau	plat¢ + eau ➔ plateau	Yes
platelet	plate + let ➔ platelet	Yes

80% of their peers have reached mastery and decoded words that contained targeted affixes in text less than 80% of the time, the student would be provided with Tier 3 intervention within the MTSS framework.

Progress Monitoring Strategy Tier 3: Word Matrices. After developing a list of word sums and as such understanding the spelling of the base and the prefixes and suffixes that may attach to it, a Word Matrix may be developed. Therefore, this strategy, similar to Word Sums, could be introduced in Tier 1 or Tier 2 as well. However, given the visual nature of Word Matrices, they may be particularly helpful for students who did not reach criteria in Tier 1 or Tier 2 intervention. A Word Matrix serves as a "map" of a given word family and may be relatively simple or complex based on student and teacher understanding of the words within family. Additionally, matrices may be relatively simple or complex based on the size of a given word family. Some word families are large with many members (e.g., see example of ⟨act⟩ family in Table 2), and others are relatively small, with there being few words in the English language that share the same base (e.g., ⟨do⟩ and ⟨does⟩). For an example of the resulting word matrix using the Word Sums for ⟨plate⟩ described above, see Figure 1.

Once a student is placed in Tier 3, the SLP may be leading the interprofessional team efforts to increase their morphological abilities as they relate to reading, spelling, and understanding a word's meaning. As such, the SLP may wish to have several well-defined learning objectives to document progress and look for patterns in the student's

learning that may indicate where they are experiencing increased difficulty (e.g., spelling opaque words). If the SLP took data on the objectives below, they would have a thorough understanding of the student's ability to (a) spell polymorphemic words, especially affix elements, when given the spelling of the base word; (b) hypothesize about the morphological components of words (i.e., Word Sums) when giving a set of bases and affixes; and (c) define words that share meaning due to their morphological structure (i.e., contain the same base element). While there are no set guidelines regarding the length of Tier 3 intervention, the SLP may wish to structure intervention sessions and dosage similar to what has been reported in the literature. For example, Wolter and Green (2013) provided daily morphological intervention to an 8-year-old boy, with each session lasting 1 hr for 2 weeks (i.e., 10 sessions in total). Depending on the MTSS model used in a given school and available special education resources and funding, variation of this intervention model may be made. If a school did not consider Tier 3 to be special education, then a student who did not meet the learning objectives below and remained discrepant from peers in the weekly spelling samples may require a referral for special education services.

1. When given a list of 10 "Tier 2" base words from curricular content, as well as a cloze statement (e.g., quiet. The children spoke _____), the student will write the spelling of a polymorphemic word by including an affix to the base word with 80% accuracy across three consecutive sessions by the end of this Individualized Education Program (CCSS.ELA-LITERACY.L.2.2.D).

2. When given cards containing base word and possible affixes commonly observed in curricular content, the student will physically arrange the affix cards, making "word families" to indicate which affixes may attach to the base, and then write associated Word Sums with 80% accuracy (for each base) by the end of this Individualized Education Program (CCSS.ELA-LITERACY.RF.2.3.D; CCSS.ELA-LITERACY.L.2.4.C).

3. When presented with a "word family" (e.g., help, helping, helpful, helper), the student will point to the affix attached to the base word or base attached to a base word (i.e., compound word) and give a plausible

Figure 1. Example of Word Matrix.

verbal definition of the polymorphic word across 20 word families (CCSS.ELA-LITERACY.L.2.4.B, CCSS.ELA-LITERACY.L.2.4.C, CCSS.ELA-LITERACY.L.2.4.D).

Fourth-Grade Morphological Strategies

Students are exposed to substantially more morphologically complex words in the upper elementary grades than in the lower elementary grades (Anglin, 1993; Nagy & Anderson, 1984). Many words encountered in written texts are based on Latin and Greek roots (Henry, 2010). As noted in Table 2, the base of a word may stand alone (thereby known as a "free base") or may not be able to stand alone (thereby known as a "bound base"). The meaning and structure (i.e., spelling) of our present-day English free and bound base elements have been developed and refined over hundreds and thousands of years, oftentimes preserving the structure/spelling found in historical roots from which English words originated (e.g., Greek, Latin, French). It should be noted, for the purposes of this tutorial, the terms "bound base" and "root" will be used interchangeably to reflect the terminology used in the CCSS. As such, investigating a word's root allows one to develop a deeper understanding of the word's meaning, as well as the meaning of other words that share the same base and/or root. For example, the bases ⟨please⟩ (meaning "*to be agreeable*") and ⟨plea⟩ (meaning "*lawsuit, decision, decree*") represent different word families, yet share similar meaning, as both bases were derived from the Latin root *placere,* meaning *"to please, give pleasure, be approved."*

Students must be able to dissect complex vocabulary words containing derivational morphemes encountered in verbal instruction in the classroom and in grade-level texts into roots/bases and affixes. Students must also be familiar with the meanings of these roots/bases and affixes and understand the meanings of their combinations to (a) determine the meaning of new vocabulary words, (b) comprehend texts containing these words, (c) quickly decode these words by attending to the morphemic units rather than the phonemic units, and (d) spell these words correctly by preserving the orthographic representation of each morphological unit, regardless of the pronunciation pattern.

Given the substantial increase in the number of morphologically complex words to which students are exposed in Grade 4, it is not surprising that morphological knowledge is noted in several Grade 4 academic standards targeting vocabulary acquisition and use and foundational skills for reading (see Table 1). Thus, increasing students' morphological knowledge is an excellent target for intervention.

Fourth-Grade Classroom-Based Collaboration

The complex vocabulary introduced in Grade 4 necessitates targeting Latin and Greek root knowledge. Many students who struggle to develop their literacy skills need explicit instruction in derivational morphological knowledge as well as continued instruction in inflectional morphological knowledge. For example, students such as these may

not preserve the orthographic representation of derivational and inflectional morphemes when spelling polymorphemic words (e.g., *wokt/walked, siclist/cyclist*). Intervention in Grade 4 will focus heavily on knowledge of Latin and Greek roots with continued instruction on derivational and inflectional suffixes using word building, word segmenting, and word relatives strategies.

To develop a strategic plan with the classroom teacher for addressing Latin and Greek roots, an initial step should include reviewing the curriculum as well as the state standards with that teacher. Many curricula include a list of Latin and Greek roots with which students are expected to be familiar by the end of the school year. This initial collaboration with the classroom teacher will help establish a clear and shared focus and ensure that processes are aligned with local and state standards. Because of the numerous ways in which services might be delivered under an interprofessional collaborative model, it is imperative that the SLP and teacher define their roles and responsibilities in this process. Establishing these roles from the outset helps to support a team approach and maintain a climate of mutual respect and shared values. In the examples that follow, a collaborative team teaching approach is implemented in which the SLP's role is to teach word study strategies to facilitate students' comprehension of morphologically complex words, and the teacher's role is to incorporate and contextualize those strategies into the regular curriculum at the first tier of support.

Classroom-Based Collaboration Strategy Tier 1: Vocabulary Journals. Collaborating with the classroom teacher helps to ensure that the interventions are relevant to the curriculum. One way to establish this common relationship is to develop a general goal that aligns with fourth-grade CCSS for morphology can be developed for classroom instruction: "Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., *telegraph, photograph, autograph*)" (CCSS.ELA-LITERACY.L.4.4.B).

Vocabulary Journals are an excellent medium for classroom-based morphological instruction (i.e., word study) in Grade 4. Each student in the classroom receives a journal, and times are designated throughout each week for word study. The SLP and the classroom teacher collaboratively team teach word study lessons on Latin and Greek roots once or twice weekly. Though not an exhaustive list, word building, word segmentation, and word relatives strategies are excellent examples of instructional activities that could be used in vocabulary journaling (see Apel & Werfel, 2014; Collins & Wolter, 2017; Gibson & Wolter, 2015; Goodwin et al., 2012; Wolter & Collins, 2017; Wolter & Green, 2013, for more information on these instructional activities).

Word Building is an activity that can be used to promote students' knowledge of morphology. Word Building involves combining bases/roots with affixes to "build" real or novel words. One way to introduce word building involves presenting students with color-coded index cards with the following four categories: prefixes, Latin roots, Greek

roots, and suffixes. The reason for separating Greek and Latin roots into their own categories is that many words derived from Latin and Greek roots contain more than one root. This will help students understand that Greek roots combine with other Greek roots (e.g., *auto + graph*) and Latin roots combine with other Latin roots (e.g., *centi + meter*) when forming real words. Students can be directed to manipulate the affixes and roots to create as many real words as they can and reflecting on the meanings of those words and word parts (morphemes).

Once students are familiar with how to manipulate the morpheme cards, they can be instructed to create non-sense words and define them. For example, *micro (small) + flex (bend) + ology (study of)* could be combined and defined as *the study of small bendy things*. While these are not real vocabulary words, students' morphological knowledge and awareness is strengthened through this activity. As students create these novel words and definitions and record them in their Vocabulary Journals, they are encouraged to reflect on the meaning of each of the morphological units. While spelling these words in their journals, the teacher and the SLP provide an opportunity to discuss the preservation of the spelling of the individual morphemes within the word. For example, the teacher could ask for suggestions for how the novel word might be spelled and write students' suggested spellings on a dry erase board. This is a rich opportunity for discussion around word study characteristic of a supportive learning environment in which inquiry and problem solving are valued above arriving at a single correct answer. Should a student suggest a phonetically based spelling, such as ⟨microflecksolugy⟩, the SLP could explain that, although this spelling might be helpful if someone encountered this word in a reading passage and wanted to know how to pronounce it, it would not help the reader understand the "meaning" of the word. The SLP could direct the class's attention to the meanings of the morphological units and ask them to think of another way to spell the word, thus reinforcing the notion that the orthographic representation of the morpheme is largely preserved when combined with other morphemes, regardless of the pronunciation pattern.

One advantage of collaboratively team-teaching word study lessons is that the classroom teacher can gain a better understanding of how to increase students' morphological knowledge and awareness by observing the SLP. The SLP can also gain a better understanding of classroom expectations and dynamics. This increase in understanding of one another's roles and responsibilities helps to foster a climate of mutual respect and shared values. Furthermore, students with typically developing language skills can provide ongoing peer modeling to students struggling to attain morphological knowledge.

Classroom-Based Small Group Strategy Tier 2: Word Segmentation Activities. Students who do not respond sufficiently to this first tier of support receive targeted interventions that supplement the classroom-based instruction in small groups for 30 min twice weekly. In the example that follows, small group interventions at this second tier of

support are delivered by a paraeducator in consultation with the SLP. The SLP provides the paraeducator with focused professional development in morphological knowledge and teaching morphological awareness strategies and helps them to develop a treatment plan with a clear and shared focus. Together, this interprofessional team can work together to plan, deliver, and evaluate the effectiveness of these students' services.

For students receiving Tier 2 instruction, a goal aligned with the CCSS for the Word Segmentation Activity was developed: *"Students will demonstrate comprehension of the meanings of vocabulary words derived from Latin and Greek roots selected from his fourth-grade curriculum by writing accurate student-friendly definitions of at least 23 of the 25 words in their vocabulary journals."*

Similar to Word Sums, the goal of creating a Word Segmentation Activity is to illustrate how polymorphemic words can be broken down into their smaller units of meaning. The classroom teacher could encourage students to record unfamiliar words they encounter derived from Latin and Greek roots in their vocabulary journals. These words could be reviewed with the paraeducator during focused Tier 2 word study. The paraeducator could first demonstrate how to segment a morphologically complex word into individual morphemes; identify which of those morphemes are roots/bases, prefixes, and suffixes; and identify the meaning of each morpheme. Given the example *unilateral,* a fairly common word that may be unfamiliar to a fourth grader, the paraeducator could guide the students in creating a chart in their journal (see Table 5).

An advantage of recording this information in their vocabulary journals is that students can access and review their notes at any time. When they encounter unfamiliar words containing some familiar morphemes, they can use their existing knowledge to help them determine the overall meaning of the unfamiliar word. Were students to encounter the word *bilateral,* they could use their existing knowledge of *lateral* (having to do with "side") to see that they could apply the meaning of *bi–* in the same way *uni–* was applied to arrive at the meaning *two-sided*. Students who are not already aware that *bi–* means *two* from familiar words like *bicycle* may either need direct instruction in the meaning of the prefix or instruction in locating the meaning from a dictionary or other reference. One advantage of small group instruction at Tier 2 is that it allows for more comprehensive evaluation of student responses and opportunities to provide more immediate feedback during the learning process than is feasible with a large classroom of students.

Progress Monitoring Intervention Strategy Tier 3: Word Relatives. At this tier of support, the SLP provides direct, specialized services either individually or in a very small group setting. The SLP tracks students' learning, monitors their progress, and communicates students' performance to other members of the interprofessional team. The SLP will write goals and objectives that further established with the classroom teacher that are aligned with state standards. Several short-term objectives that could

Table 5. Sample of Word Segmentation Activity.

Prefix/meaning	Word root/meaning	Suffix/meaning	Multimorphemic word/student-friendly definition
uni–/one	later/side	*–al*/having to do with	Unilateral = Having to do with one side, one-sided

be developed to support progress monitoring include the following:

1. Given polymorphemic words containing Latin or Greek roots, the student will independently identify the roots and affixes with at least 90% accuracy (CCSS.ELA-LITERACY.L.4.4.B, CCSS.ELA-LITERACY.RF.4.3.A).

2. The student will independently identify the meanings of at least 23 of the 25 Latin and Greek roots introduced in the fourth-grade curriculum (CCSS.ELA-LITERACY.L.4.4.B, CCSS.ELA-LITERACY.RF.4.3.A).

3. Given 10 Latin or Greek roots, the student will generate at least three words derived from those roots (CCSS.ELA-LITERACY.L.4.4.B).

4. After dissecting polymorphemic words into individual morphemic units, the student will write student-friendly definitions of each morpheme with clinician support as needed (CCSS.ELA-LITERACY.L.4.4.B, CCSS.ELA-LITERACY.RF.4.3.A).

In the example that follows, the Word Relatives strategy is used to illustrate how the SLP can intervene to increase students' morphological knowledge using their Vocabulary Journals. The Word Relatives strategy (Apel et al., 2013; Wasowicz et al., 2012) is designed to direct students' attention to the common bases/roots that words share. To begin, the SLP could model some examples and some nonexamples of word relatives. The SLP could select a Latin or Greek root from the curriculum, such as *sol,* and write it on a dry erase board. After explaining that *sol* means *sun,* she could go on to explain that there are several words containing *sol* that are related to the sun. She could give examples like, "a para*sol* protects you from the sun, and the *sol*ar system is a system of planets around the sun. *Parasol* and *solar* both contain ⟨sol⟩ and both have something to do with the sun. Do you think these are relatives?" Students are encouraged to segment the presented words in their journals to help them determine if they are "word relatives."

Once students are familiar with the task, the SLP can introduce foils. She could say, "Let's try a few more. Is *solid* a relative of *sol*? I see ⟨sol⟩ in *solid*." If students respond incorrectly, the SLP will redirect their attention to the meaning of each morpheme, explaining that words can look alike and they can sound alike, but that does not mean that they are related. The SLP could further explain that sometimes word relatives look alike although they do not sound alike (e.g., *sol*ar, para*sol*), and sometimes word relatives do not even look alike (e.g., con*quer*, ac*quir*e). The

SLP could emphasize that words are only relatives if they share meaning and structure. This activity could be continued across multiple sessions by instructing students to write targeted Latin and Greek roots on different pages in their vocabulary journals. As students encounter "word relatives," they will list them under that root along with a student-friendly definition. If students encounter words that are not related although they are orthographically similar, they could list those in a separate column for nonexamples. A Word Relatives excerpt from a vocabulary journal is illustrated in Figure 2.

Final Thoughts

Recently research summarizes the benefit of morphological interventions on a variety of students' oral and written language skills (e.g., Bowers et al., 2010; Goodwin & Ahn, 2010, 2013). In this tutorial, we explored ways classroom teachers and school-based SLPs can provide morphological instruction within an MTSS model across three elementary grades. While teachers use the CCSS as a guide for curricular instruction, several CCSS strands requiring morphological knowledge (Gabig & Zaretsky, 2013) are available to create a collaborative opportunity for teachers and SLPs. Teachers may not be equipped with the background knowledge needed to provide high-quality general classroom morphological instruction. SLPs possess content and instructional knowledge of morphology, making us ideally suited to explore interprofessional collaborative practice in the classroom to increase literacy outcomes. Although a few studies have explored teachers' understanding of morphological concepts (e.g., Moats & Foorman, 2003; Washburn & Mulcahy, 2018; Washburn et al., 2011) and the effects of teacher training on students' morphological knowledge (Henbest et al., 2019), more studies are

Figure 2. Example of Word Relatives.
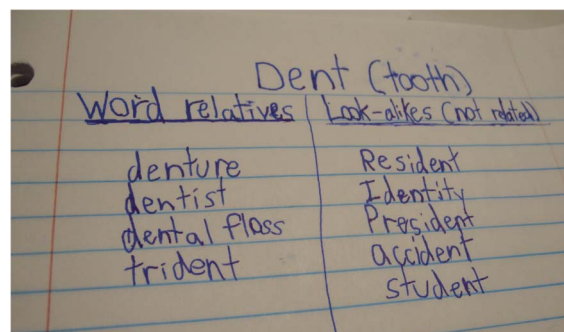
needed in this area to explore the morphological content and pedagogical delivery of morphological interventions. Interestingly, the results of Henbest et al. (2019) suggest that a lack of improvement in educators' morphological knowledge still results in students' growth in morphological knowledge; however, it seems likely that educators with greater understanding of morphology would be more able to provide instruction that resulted in even greater student growth. Therefore, future research should explore the critical content that should be included in pre- or postprofessional training on morphology for educators, including SLPs. Ideally, we should investigate how educators' knowledge of this critical content influences students' morphological knowledge, as well as other language and literacy skills. Beyond investigating the training to develop educators' content and pedagogical knowledge, additional research is needed on how morphological interventions, when implemented within an MTSS framework, improves students' oral and written language skills. It is possible that an earlier focus on morphology across all tiers of the MTSS framework could reduce referrals for special education services; however, this is an empirical question that has yet to be investigated.

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