In this chapter, the authors argue that the alphabetic principle is a faulty guide for literacy instruction. The alphabetic principle is the standard phrase used in educational research to characterise English orthography as a system in which the alphabetic letters function to represent the sounds of words (e.g. Adams, 1990; Byrne, 1998; Castles, Rastles & Nation, 2018). When based on this understanding of English orthography, literacy instruction – especially in the early years – addresses phonological influences on orthography while ignoring the function of the other linguistic influences, namely morphology and etymology. The authors argue that it is critical to teach students about the interrelation of morphology, etymology and phonology; that is, to provide children with early literacy instruction that reflects more accurately how reading and writing work. The chapter explains English orthography and explores theory and research related to this linguistic understanding. It also provides practical advice for teachers who may wish to provide instruction that accounts for all three influences on orthography.

The heart of this chapter is an account by Lyn Anderson and Ann Whiting of early literacy instruction that explicitly embeds knowledge about morphology, etymology and phonology in classroom learning over the course of a school year. These educators illustrate how young children can begin literacy learning through guided inquiry into the structures and conventions of orthographic word families. Anderson and Whiting focus on sets of words that meet the linguistic definition of ‘word families’, that is, words linked by connections of orthographic structures and meaning (e.g. cycle, bicycle, recycling) rather than common rimes (e.g. bed, fed, red). The literacy instruction exemplified in the chapter reflects the long-established linguistic understanding that the primary function of English orthography (spelling) is to represent meaning through the interrelation of morphological, etymological and phonological influences (Venezky, 1970, 1999; Chomsky, 1970). This classroom account demonstrates how four-, five- and six-year-olds can learn to read and write through orthographic inquiry.
UNDERSTANDING ENGLISH ORTHOGRAPHY

Pete Bowers & Gail Venable

Orthography is the writing system of a language that evolves to represent the sense and meaning of a language to those who already know and speak it. The three components of English orthography are interrelated (Venezky, 1970, 1999; Chomsky & Halle, 1968):

- **Orthographic morphology**: the system that organises the structural elements of meaning (bases and affixes)
- **Orthographic etymology**: the historical journey of a word through time and the relationship between words in present-day English with a common ‘ancestor’ (e.g. the words cycle, bicycle and cyclone are all derived from the ancient Greek root kyklos).
- **Orthographic phonology**: the conventions that govern how graphemes (units of spelling) represent phonemes (units of pronunciation that can affect meaning)

Grapheme–phoneme correspondences (GPCs) cannot be understood without reference to morphology and etymology (Venezky, 1970, 1999; Chomsky, 1970). Crucially, this long-standing, uncontroversial understanding of English spelling in the field of linguistics directly contradicts the assumption behind the alphabetic principle that drives so much of early literacy instruction. See J. Bowers (2018) for more on the failure of the alphabetic principle to represent how English orthography actually works, and the implications for learning when instruction is driven by this model that misrepresents the system children are trying to learn.

Why is an anecdotal account of literacy instruction through orthographic inquiry, like the one in this chapter, worthy of close study by educators and researchers? Simply put, this account offers a direct response to identified needs in current research.

For decades, the prevailing message from reading researchers has been:

- the English writing system is based on the alphabetic principle
- early literacy instruction must therefore focus on the mastery of phonics
- only when letter–sound correspondences have been thoroughly established should other linguistic features of English spelling be introduced.

In her highly influential work, Adams (1990) argues that teaching morphology to younger and less able students could be a mistake. A recent series of articles by Kathy Rastle and colleagues (Castles, Rastle & Nation, 2018; Rastle, 2018; Rastle & Taylor, 2018; Taylor, Davis & Rastle, 2017) echoes Adams’ position. As Rastle and Taylor (2018) write, ‘We believe that a focus on these morphological regularities is likely to be more appropriate in the later years of primary schooling’. Bowers and Bowers (2017, 2018 a,b,c) have responded with a series of articles describing critical flaws in this argument.

The view that beginning literacy instruction should only address phonological influences on orthography, while avoiding other linguistic influences like morphology and etymology, has been labelled by Bowers and Bowers (2018c) as the ‘phonology-first hypothesis’. We know of no studies showing that teaching beginning readers about morphology results in weaker outcomes than phonology-first instruction. Therefore, there is no evidence-based reason to exclude morphology from early literacy instruction. In fact, the evidence supports the opposite conclusion. Meta-analyses (P. Bowers, Kirby & Deacon, 2010; Goodwin & Ahn, 2010, 2013) and reviews (Carlisle, 2010; Reed, 2008) all show that morphological instruction is beneficial for literacy learning, especially for less able and younger students. P. Bowers, Kirby and Deacon (2010) specifically compared outcomes of morphological instruction for pre-school to Grade 2 students.
with the outcomes for Grade 3 and above. The effects on the literacy development of the younger students were at least equal to the effects for older students, with the vast majority of younger students gaining more from morphological instruction, as did the less able students in both groups.

Although research supports morphological instruction from the start for improving vocabulary learning, reading and spelling for younger students, and in particular for less able students, there is no evidence for the most effective way to teach it (P. Bowers, Kirby & Deacon, 2010; Kirby & P. Bowers, 2017, 2018), nor are many teachers equipped with the knowledge to teach about morphology effectively.

One serious barrier to the inclusion of morphological instruction in elementary schools is that teachers, and many teacher educators, are themselves unfamiliar with morphology. Greater communication among researchers, teachers, and teacher educators is required. (Kirby & P. Bowers, 2017, p.238)

The account of classroom instruction by Anderson and Whiting, below, is a direct response to the need for more research into how best to include morphological knowledge in early literacy instruction, and the need to provide teachers with more knowledge about morphology. It is important to understand, however, that Anderson and Whiting are not adding morphology to phonological instruction; rather, they are teaching students about the interrelation of morphology, etymology and phonology. In doing so, their teaching reflects how our writing system actually works. As renowned linguist Venezky (1999, p.4) writes:

English orthography is not a failed phonetic transcription system, invented out of madness or perversity. Instead, it is a more complex system that preserves bits of history (i.e. etymology), facilitates understanding, and also translates into sound.

What Anderson and Whiting describe as ‘orthographic inquiry’ is exactly in line with structured word inquiry, a term used by P. Bowers and Kirby (2010) to describe a process of scientific inquiry for teaching Grade 4/5 about the interrelation of morphology, etymology and phonology, a process that was found to have benefits for vocabulary learning. While there is a growing bank of morphological intervention studies, we know of only two studies beyond P. Bowers et al. (2010) who have tested structured word inquiry (Devonshire & Fluck, 2010; Devonshire, Morris & Fluck, 2013). The effects in both studies were positive, but the study by Devonshire et al. (2013) with 4- and 5-year-olds is particularly relevant to structured word inquiry and the current debate about how morphological concepts should feature in early literacy instruction. They found significant effects on standardised measures of reading and spelling for the structured word inquiry condition when compared to a phonics condition. One thing that Bowers and Bowers, and Rastle and colleagues, agree on is that there is need for more research to test the instructional hypothesis presented by structured word inquiry. There is, however, a serious barrier to meeting this identified research need.

For decades researchers and educators have been working in a context in which a very influential (untested) assumption has been that literacy instruction should target phonological aspects of print before other linguistic features. Explicit recommendations to avoid morphological instruction in the early years so as to establish phonological patterns (e.g. Adams, 1990; Rastle & Taylor, 2018) have been a hindrance to research on morphological instruction. In addition, until relatively recent times, morphological instruction received very little attention in the research. Hugely influential reviews of early literacy research such as the National Reading Panel (NRP, 2000) and Rayner, Foorman, Perfetti, Pesetsky and Seidenberg (2001) make no mention of morphological instruction at all.

The premise that all children deserve ‘best practice’ instruction from the beginning of schooling underpins the three-tiered approach of Response to Intervention (RtI), an area of research which targets those struggling with literacy learning (e.g. Fuchs & Fuchs, 2006; Al Otaiba & Fuchs, 2006; Spear-Swerling
& Cheesman, 2012; see also Buckingham, Wheldall & Wheldall, Chapter 4, this volume). However, to our knowledge no studies informing RtI models include morphological instruction. An RtI study by Al Otaiba and Fuchs (2006) sought to enhance understanding of ‘the needs of children who do not respond to scientifically based classroom (or primary-level) instruction’ (p.428). In their conclusion, the authors lament the fact that there are so many students that they do not know how to help. They write:

Perhaps the most humbling implication of our study is that although we and others have learned much about what is necessary to reduce the number of nonresponders and to understand some of the characteristics that make it difficult for them to learn to read in mainstream classrooms, we do not yet know nearly enough about which specific approaches are key to ensure that no child is left behind. (p.428)

They recognise that the phonologically based instruction that they believed was the best research practice was ineffective for many students. However, they make no mention of morphological instruction as an area to investigate, let alone instruction that accounts for the interrelation between morphology, etymology and phonology. The attention to morphology in the research has been so lacking that these authors did not even consider it as a possibility.

Above we have catalogued evidence of:

• a long-standing recommendation of avoiding morphology for younger and less able students
• multiple major reviews of literacy instruction that fail to make any mention of morphological or etymological instruction, and
• RtI research focusing on helping less able students that makes no mention of morphological or etymological instruction as part of ‘best practice’.

This history of literacy research over the decades reveals a systematic bias towards phonological instruction. The research interest in morphological instruction has grown in recent years, especially for older students, but this literature still pales in comparison to the vast literature on phonologically based instruction. Etymological instruction receives even less research attention than morphology. A result of this systematic bias is that few researchers or educators have deep experience with instruction about the interrelation of morphology, etymology and phonology, especially in the younger years. That lack of experience makes it difficult for many to imagine what such instruction could even look like in the early years.

The present state of affairs in the research is one reason that this account by Anderson and Whiting is so important. They both have been developing their understanding and practice of orthographic inquiry as literacy instruction in their classrooms for well over two decades. Their account builds on a rare combination of orthographic knowledge and classroom experience, expertise most teachers still need to develop (Kirby & P. Bowers, 2017). This is exactly the appropriate role of practitioner-based inquiry: to provide ideas that can be drawn on to guide the design of experiments that can test current research questions.

After this instructional account, we highlight specific practices to show how they link to current research and theory about literacy learning, and also what we know about learning in general.
Orthographic inquiry in the classroom

Lyn Anderson and Ann Whiting

Our learning community is comprised of young students (four-, five- and six-year-olds). There is a wide range of learners in our class – those who are beginning to interact with the text, to those who are working independently when reading and writing. This class includes students who speak English as a first language and as an additional language (EAL). Some EAL students are competent in communicating in English while others are new to the language. All members of the learning community, including teachers, study how the oral and written language works through a process of scientific inquiry as described in the classroom vignette below. This process of uncovering the meaning, sense and order of their writing system motivates and facilitates learning to read and write.

Words are in the mainstream in our classroom where orthographic inquiry is a vital part of the current learning and everyday discourse (ACELA1434, ACELA1454). Morphology frames the understanding of etymology and especially phonology (ACELA1818). As you follow the orthographic journey of these young students, you will understand that orthographic phonology can only be fully understood by studying the morphology and etymology of the word (Venezky, 1967, 1999; Chomsky & Halle, 1968).

The learning context

Our orthographic journey begins within the learning context of this classroom study:

There are many cycles that affect life on earth.

We read Jeannie Baker’s Circle (2016) to begin the conceptual and orthographic understanding of ‘cycles’ (ACELY1646, ACELA1786), starting with the question:

What word best captures the heart of this story?

The learning community suggests a host of words such as cycles, journey, birds, Godwit, migration (ACELY1660). We select a key word, cycles, central to the text and the unit of inquiry (ACELA1434). At the same time, we will study the orthography of cycle through the three components: morphology, etymology and phonology. By investigating the word cycle, the students will learn significant orthographic conventions and principles that apply to all words (ACELA818). Deliberately embedding orthographic inquiry brings a deep understanding of the sense and order inherent in English orthography. This enriches the themes and concepts of our study. Our quest for understanding will take us full circle (see Figure 7.1).

Figure 7.1 An orthographic cycle of learning – embedding orthography into the curriculum
The orthographic journey

We build the excitement for the unit of inquiry by piecing together the learning statement (Figure 7.2). The students notice which keywords have been emphasised. This leads to our first discussion:

**T** What are cycles? What are cycles not?

We begin with meaning. We ask our learning community to share their understanding of cycles (ACELA1437). We determine what something is by considering what something is not. The questions are revisited with each learning experience so our working understanding of cycles is refined and developed. In this way, orthographic inquiry deepens conceptual understanding.

**Figure 7.3** The water cycle – one of the cycles investigated in this Unit of Inquiry

We plan relevant learning experiences that provoke student thinking about cycles, whether it be the study of seasonal changes through the lifetime of trees, the study of the beating rain in a tropical storm, or the water cycle (Figure 7.3). We observe machines that use cyclical parts. ‘A bicycle, that goes round and round . . . ‘ (Lola, 4 years old) sparks an enthusiastic conversation as we determine which of the bike’s components rotate. We scribe the children’s thoughts, planting important orthographic ‘learning seeds’ as we announce (spell aloud), rather than pronounce, the morphemes of each word, in particular bicycle and bike (Figure 7.4) (ACELA1433):

**T** bi (pause) c-y-c-l-e, bicycle.

**T** b-i-k-e, bike.

We pause, pondering aloud, ‘I’m wondering, is b-i-k-e a free base element?’

We intentionally use accurate terminology in everyday discourse before we define it in context. Soon we will explicitly define a free base element that can be used as a word on its own, without affixes.
The regular practice of ‘announcing’ (spelling aloud) the spelling of the morphemes and graphemes focuses attention on the orthographic structures, principles and conventions to be studied. We pause at morpheme boundaries to reveal the deep structure. We don’t know how an element, a written morpheme, will be pronounced until it is realised in a word. Elements have no pronunciation until they are synthesised but they do have a reliable, consistent spelling.

We continue to introduce new words such as recycled, cycling and tricycles. A discussion occurs about the collection of recycled materials which the students are using to design and construct (ACELA1437). As we scribe the students’ thinking, we announce the orthographic structure of recycled:

T re (pause) c-y-c-l - replace the final, non-syllabic e (pause) ed, recycled.

The single, final, non-syllabic < e >, occurring finally in a base element, is an orthographic marker with several critical functions. A final non syllabic < e > is replaced by a vocalic (vowel) suffix – one of three critical suffixing principles. Notice that we have introduced this accurate linguistic terminology in our classroom discourse as part of the students’ orthographic development.

At this moment, it is not necessary to explain the replacement of the final, non-syllabic < e >, but to ensure the students are exposed to this suffixing principle. We observe the student’s curiosity about this principle – an inquiry for another day.

We maintain our focus on identifying the underlying meaning connecting these words to prepare them for the concept of morphological families:

T How are cycles, bicycles and recycled alike?

We listen carefully to students’ conversations, noting their use of new and unfamiliar words as they build their lexicon connected to the morphological family of cycles. Now, we are ready to focus on morphology.

**Identifying the morphological family**

During this morphological investigation, the students will learn that words are related by a common base element and share an underlying meaning. A small set of familiar related words – cycles, cycling, bicycle, tricycles, recycle – are placed in a word bag (Figure 7.5).

T Words belong in families. Let’s find out the family of cycle.

One or two words are revealed and read each day. The teachers and students share their understanding.

T How can you use cycling in a sentence? What does tricycle mean to you?

Figure 7.5 Working morphologically – selecting words from a word bag to discover the morphological relatives of cycles.
We announce (spell aloud), rather than pronounce, the elements of each word, for example:

**T** C-y-c-l-e, replace the final non-syllabic < e > *(pause)* ing, cycling.

We hypothesise which words belong to the morphological family and place the words in or out of the word web. The children illustrate the words collaboratively and the word web begins to grow, as does the student’s understanding. Word webs are a collection of the morphological family (Figure 7.6) (ACELA1818).

**Figure 7.6** Beginning the word web – announcing aloud the structure of cycle and tricycle.

Each time the students encounter the word bag, we add a new word (cyclist, cycled, recycling) and often a provocation to consider: circle, cylinder, cyclamen, upcycle. Some of these new words may be unfamiliar to the students. We deliberately widen their lexicon to guide their morphological understanding.

We now shift our focus to understand base elements, the ‘main building block’ of words.

**T** Bicycle is related to cycles. They share the same base element, c-y-c-l-e.

We write < cycle > on the classroom chart and explain that this is a signal to ‘announce’ what is inside the angle brackets: ‘c-y-c-l-e’.

Students have been exposed to the morphological term ‘base element’ many times in our conversation. It’s at this point some students immediately announce the base element while others continue to work towards an understanding of this concept.

Within the context of the base element < cycle >, we explicitly teach the names of the alphabet letters for those who need it; introduce the conventional English graphemes and the orthographic markers, such as the single, final, non-syllabic < e >. We model how to write and announce the base element in the central part of the word web (Figure 7.7) (ACELY1653, ACELA1440).

**Figure 7.7** Word web of related words with hypothesised base element < cycle >

We now turn to etymology to hear the story of cycle.

**Working etymologically**

Every word has an etymological story. A word’s etymology reveals its roots with the journey into present-day English impacting its morphemes and choice of graphemes. We use images and reveal the etymological tree to share the journey of cycle through time (Figures 7.8 & 7.9).
Cycle as a noun, was first attested (documented) in writing in the late 14th century. It derives from the Greek word κύκλος, meaning ‘circular body, motion, cycle of events’. This root and its more distant ancestor produced a large family of words. Words such as cyclamen and cyclone are etymologically related to cycles; they share a common root, not a common base element. There is an echo of circularity throughout all these words (see Harper's Online Etymology Dictionary at https://www.etymonline.com).

We find another distant relative when we share the story of Cyclops, literally ‘round-eyed’. We discuss how <ops> is related to optical and optometrist with a denotation of ‘eye’. The children have discovered the story in the classroom library and are eager to know more.

As the children look at the etymological journey of cycle, they ask about the <k> in the Greek root κύκλος. We examine how the word is written in the Greek script as κύκλος. The children also notice that the medial <y> has travelled throughout its etymological journey. Their questions and observations indicate that now we can tell them a medial grapheme <y> in a base element, such as <cycle>, is a reliable sign that the word has Greek origins.

Even though we are working etymologically, the students notice some phonological aspects:

- **S** The single letter grapheme <l> has always been there.
- **S** The <y> is there in Latin.
- **T** Notice that we spell ‘cycle’ with the final, non-syllabic <e>.

Excitement builds as the children and their families collect other words with a medial <y>: gymnastics, mystery, hydrate. They find these in books, in our written statements, on signs and in their own writing. We begin a chart that builds over time and discover all these words are Greek in origin.

The children also notice and ask important questions about the letter <y> in other positions: year, my, happy, key, play. Some students notice a significant phonological feature – the letter <y> can be a single letter grapheme <y> or part of a digraph: <ey>, <ay>, <uy>, <oy>, or the suffix <-y>. We draw attention to the graphemes and phonemes:

- **T** I’m noticing the initial grapheme <y> is representing the phoneme /j/ in the base element <year> but the final grapheme <y> of <my> represents /ai/. The grapheme <y> can represent different phonemes.
Although we are working etymologically, we plant important phonological ‘learning seeds’ for future investigation. Phonology is part of a complex system and so is not treated in isolation in this instructional approach. The orthographic phonology (grapheme–phoneme correspondences) of a word can only be understood within the morphological and etymological constraints (Chomsky, 1970; Venezky 1970, 1999). With this etymological knowledge, we return to the morphological component.

**Working morphologically**

We now investigate the morphological structure of *cycles*. We use large building blocks and signs to illustrate the main structural units of meaning; the written morphemes (elements): base elements, prefixes, suffixes and connecting vowel letters. Students will understand that the base element is key to the meaning and structure of a word (Figure 7.10).

**Figure 7.10 Understanding the written morphemes – the elements**

We return to the selection of words gathered on the word web with the hypothesised free base element <cycle>. We choose one word to write the orthographic word sum, announcing the written elements, pausing at the morphemic boundaries and announcing any suffixing changes (Figure 7.11):

*T c-y-c-l-e . . . plus . . . s . . . is rewritten as (rewrite arrow) . . . c-y-c-l-e . . . s, cycles.*

**Figure 7.11 The word sum for cycles is built from two elements: the free base element <cycle> and the suffix <-s>**

The word sum in Figure 7.11 shows the morphemic representation of the elements (analysis and synthesis). We justify each element with evidence of its presence in other words. We have introduced the consonant suffix <-s> as one form of the plural. Our collaborative charts flourish as students enthusiastically collect evidence of this suffix in books and the written statements in the learning environment: *dogs, plants, trees* (Figures 7.12 & 7.13). Of course students find evidence of an <-s> suffix occurring with verbs to indicate the singular third person of the present tense. We begin to differentiate the words on the chart into nouns and verbs planting learning seeds for the future.

**Figure 7.12 Confirming the elements – the inflectional plural suffix <-s>**
We start assembling the elements in a matrix as we analyse each related word in a word sum. A matrix is a powerful morphological portrait of the family. We note the base element is in bold. It is the main meaning-carrying element present in every word – its morphological heart. The denotation, the underlying meaning of the base element, beats beneath every word in the family (Figure 7.14).

The students write and announce the word sum on small whiteboards or in their journals as the matrix grows (ACELA1433, ACELA1818). The simultaneous actions of writing and announcing ensures the internalisation of all the elements. Notice how often the base element < cycle > is written and announced each time the student writes a new word sum (Figure 7.15).

We focus on one or two words from the cycle family throughout the day and during the weeks ahead. The children take their matrix home to share with their family. We continue to explore the differences between each word that shares the free base element < cycle >. We discover and build lists of attested affixes – prefixes and suffixes. The students add these to their matrix to construct more related words (Figure 7.16). We are now ready to turn our attention to the phonological component.
The vertical lines in the matrix are represented by the plus signs in the word sum. Words are constructed by selecting elements from cells left to right and synthesised in an orthographic word sum. The matrix cannot be said to be complete as there is always the potential for new words to be added to the morphological family (e.g. upcycle was first attested in 1994).

**Working phonologically**

Orthographic phonology is the study of the units of pronunciation relevant to the meaning of a word. It is the system by which the phonology of a language is represented by print. English orthography uses graphemes (single letters or groups of two or three letters) that spell phonemes (minimal units of speech that can affect meaning). Phonemes are represented by the IPA (International Phonetic Association) and are realised in writing by graphemes. Graphemes, the written representation of phonemes, are a set of one, two or three letters. Morphology and etymology determine the grapheme choice for a given word. A grapheme must fit the pronunciation and also fit the morphological and etymological families of the given word. Therefore, we cannot study grapheme–phoneme relationships by studying words in isolation.

Now that we have investigated the morphological and etymological components, we will study and analyse the single-letter grapheme <c> framed within the free base element <cycle>. This focused phonological investigation will deepen student understanding of the grapheme–phoneme relationship applicable to many words. Once again, the linguistic terms occur naturally in our everyday classroom discourse.

The orthography of <c> provides the relevant learning opportunity to establish two important orthographic principles:

- most graphemes can represent different phonemes
- most phonemes can be represented by more than one grapheme.

While we know the grapheme <c> can represent four phonemes, our focus will start with the two phonemes the students have identified in the initial and medial position of cycle (Figure 7.17). The students are motivated to understand as their questions drive this phonological quest.
Alphabet letters are the basic ingredients. They have different functions, one of which is to represent the meaningful elements of pronunciation (phonemes). Graphemes, formed from the alphabet letters, are the ‘smallest contrastive unit in the writing system’ (Crystal, 1994, p.139). Graphemes only bring meaning when assembled within a word. The position and circumstances of the grapheme is determined by the word’s morphology and etymology.

We start with the concrete context to understand the abstract concepts of grapheme–phoneme correspondences (ACELA1459). We place words familiar to the students, containing the single letter grapheme < c >, in the word bag: cycle, city, pencil, circus, cylinder, cake, cook, picnic, can, come, crack, character. We select a range of words:

- words where the < c > is in different positions
- both function and lexical words
- words where the letter < c > is part of another grapheme: < ck >, < ch >, < tch >
- words with other graphemes that represent the phoneme / k /: < k > – cake < ck > – crack; < ch > – character.

We want the students to notice these deliberately planted learning seeds, the impetus for future investigations. As with every orthographic quest, we begin with meaning to ensure all understand the words we investigate phonologically.

Our next encounter focuses on the circumstances of grapheme position. Students select from the word bag and identify the position of the single letter grapheme < c >.

**T** Is the single letter grapheme < c > in your word initial, medial or final?

Next, we guide the children through a concept attainment strategy where their role is to ‘think about our thinking.’ The students place the words on the Venn diagram (Figure 7.19) as directed by us.

**T** Why did I ask you to place your word, city, in the red circle or yours, picnic, in the blue circle or Max’s, circle, in the overlapping part?

**T** How interesting that cycle and circus are placed in the overlap!

Before each word is placed on the diagram, we read the word, discuss its meaning and announce (not pronounce) the structure, pausing at morpheme boundaries.

We begin with a few words and the diagram builds over a number of
days. During this time the children learn to track the phonemes, identify the graphemes they are familiar with and discover more words to write on the blank word cards. We revisit the phonological analysis frequently so the students have time to consider the grapheme circumstance in the words we are studying.

We reconvene to reflect on and discuss the words that now fill the circles of the diagram. We decide that the single letter grapheme < c > represents either the phoneme / s / or the phoneme / k / . The students notice that the words in the shared space of the diagram have two single-letter graphemes < c >, each one representing a different phoneme (Figure 7.20) (ACELA1459).

Figure 7.20 The phonology of the single-letter grapheme < c >

We now discuss the circumstances in which a single-letter grapheme < c > represents the phoneme / s /.

T How interesting the vowel grapheme < i > follows the single-letter grapheme < c > in these words: city, pencil, circus.

T < y > follows < c > in these words: cycle, cyclone, juicy < juice + y >.

T < e > follows in these words: face, cent.

We guide the students through this phonological understanding to develop a community chart of this significant phonological convention (Figure 7.21).

Figure 7.21 < c > followed by < i >, < e > or < y > can represent the phoneme / s /)

We regularly revisit the phonology of < c > to further the students’ phonological knowledge of grapheme choices. We encourage the students to add other words to the collection as they encounter them in books or when writing. We add new words daily and practise feeling the articulation in our mouth as we track the sequence of phonemes. We note that some of the letters in a word are not representing pronunciation, such as the final, single, non syllabic < e >, a key orthographic principle to develop later. We explicitly teach script as we revisit the movement pathways of the vowel letters (Figure 7.22) (ACELY1653).

We plant further phonological ‘learning seeds’ so the students will encounter other phonemes represented by the single letter grapheme < c >: / tʃ / cello, / jʃ / special; and other graphemes that represent the phoneme / k / – the digraphs < ck > and < ch >; the single letter grapheme < k > (Figure 7.23) (ACELA1459).

This orthographic learning occurs in short bursts throughout the day, everyday; small moments that incrementally build understanding of the complex component of phonology. We note students’ use of
orthographic terminology. We note their developing knowledge of the orthographic principles and conventions and how they apply this to their reading and writing. Our learning community asks many questions about the words they encounter in text and those they wish to write. The children now know that all words have a story, all have a base element. They begin to see text through an orthographic lens, words such as: like, friend, play, my, the, dinosaur, have and one. The complexities of phonology, embedded in morphology and etymology, bring sense and meaning to the written language.

Assessment

Assessment, a word derived from Latin sedere ‘to sit’, gives us the opportunity to note where students ‘sit’ with the principles and conventions of English orthography. As the student learning community varies in terms of ages and English proficiency, we keep detailed individual records of each student. We specifically take note of the student’s ability to use and apply their developing understanding of orthographic knowledge when writing and reading and through oral communication. We collect and analyse weekly writing samples from each student’s writing journal, Unit of Inquiry reflections and recordings, and word-inquiry journals. These samples are used to build a portfolio of student work demonstrating literacy growth and proficiency over time. We conference with each child when reading and writing, and their responses, questions and miscues guide our orthographic instruction. Summative assessment pieces are collected during and after each orthographic investigation. These summative assessments form part of the students’ portfolios. One summative assessment is the creation of a short text to report research findings about an animal life cycle as related to the Unit of Inquiry ACELY 1651. Another summative assessment includes a matrix and the construction and resolution of word sums (see Figure 7.16 as an example of an assessment matrix).

We use these questions for each orthographic component to make judgements of where students are in their orthographic development. This assessment informs our teaching and learning practice. We specifically observe students’ focus and engagement in the structured classroom situations even...
though students may not yet be independent readers and writers. We observe students’ application of orthographic knowledge when reading and writing across all areas of the curriculum to assess morphological, etymological and phonological understandings, as outlined below.

**Assessing morphological principles**

- Does the student use or refer to the terms base element, prefix, suffix when discussing the morphological family of words in structured classroom situations and independently?

- Does the student refer to the meaning of the related words in structured classroom situations and independently?

- Does the student announce the elements orally and when writing a word sum?

- Does the student notice introduced suffixes when reading and writing, for example: < -s >, < -ing >, < -ed >?

- Does the student add additional elements to a matrix to build new words related to the base element, for example: recycling, upcycled?

- Does the student, with support or independently, replace the single, final, non-syllabic < e > (typically called the single silent < e >) when adding a vocalic suffix, for example: < cycle/ + ing → cycling >?

- Does the student write the focus words accurately in their writing with support or independently, for example: cycle, cycles, cycling, cycled?

- Does the student apply their morphological understandings to other words when reading and writing?

**Assessing etymological understandings**

- Does the student share the word stories from the classroom investigations with others at school and at home?

- Does the student question or wonder aloud where words come from?

- Does the student hypothesise where a word comes from based on their current knowledge (for example, a Greek word because it has a medial < y > or the digraph < ph >; or the digraph < kn > and the trigraph < ugh > which indicates Old English origins)?

- Can the student use etymological resources to identify the origin of a word with support or independently?

- Does the student use their current knowledge of etymological stories to spell function words?

- Does the student understand that words have entered English from other languages and time periods?

**Assessing phonological understandings**

- Does the student recognise that a phoneme may be represented by several graphemes?

- Does the student recognise that a grapheme may represent several phonemes?

- Does the student demonstrate this understanding of the phoneme–grapheme relationship as evident in their independent writing?

- Does the student ask phonological questions when writing? For example: *Will I spell ‘city’ with the grapheme < c > or < s >? Will I spell ‘kitten’ with a < c > or < k >?*
• Does the student hypothesise a grapheme choice based on their current knowledge with support or independently?
• Does the student track the phonemes in sequence with support or independently?

**Morphology content in the Curriculum**

Morphology content is included in the Language strand of the Australian Curriculum: English at all primary school year levels from Foundation to Year 6. This content is located alongside knowledge about phonology in the Phonics and word knowledge sub-strand. In this section Lyn Anderson and Ann Whiting demonstrate the importance of teaching the interrelatedness of all three components of orthography, morphology, etymology and phonology, from the beginning of schooling.

**Table 7.1 Morphology content in the Australian Curriculum: English (Foundation to Year 2)**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CODE</th>
<th>AC:E CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundation year</strong></td>
<td>ACELA1818</td>
<td><strong>Content descriptor</strong> Understand that words are units of meaning and can be made of more than one meaningful part</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Elaboration</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• learning that words are made up of meaningful parts, for example ‘dogs’ has two meaningful parts ‘dog’ and ‘s’ meaning more than one</td>
</tr>
<tr>
<td>Year 1</td>
<td>ACELA1455</td>
<td><strong>Content descriptor</strong> Recognise and know how to use simple grammatical morphemes to create word families</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Elaborations</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• building word families from common morphemes, for example ‘play’, ‘plays’, ‘playing’, ‘played’, ‘playground’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• using morphemes to read words, for example by recognising the base word in words such as ‘walk-ed’</td>
</tr>
<tr>
<td>Year 2</td>
<td>ACELA1472</td>
<td><strong>Content descriptor</strong> Build morphemic word families using knowledge of prefixes and suffixes</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Elaboration</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• discussing how a prefix or suffix affects meaning, for example in the word ‘paint-er’ the suffix ‘er’ means ‘one who’, so a painter is ‘one who paints’</td>
</tr>
<tr>
<td></td>
<td>ACELA1823</td>
<td><strong>Content descriptor</strong> Use knowledge of letter patterns and morphemes to read and write high-frequency words and words whose spelling is not predictable from their sounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Elaboration</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• using known words in writing and spelling unknown words using morphemic knowledge of letter patterns and morphemes, for example the words ‘sometimes’, ‘something’ and ‘anything’</td>
</tr>
</tbody>
</table>
The teaching sequence presented in this chapter illustrates how teaching about morphology complements teaching of the following Curriculum early years content (Table 7.2).

Table 7.2 Curriculum content relating to early years teaching of morphology

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CODE</th>
<th>ACE CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation year</td>
<td>ACELA1434</td>
<td>Language: Expressing and developing ideas</td>
</tr>
<tr>
<td></td>
<td>ACELA1686</td>
<td>Recognise that texts are made up of words and groups of words that make meaning</td>
</tr>
<tr>
<td></td>
<td>ACELA1786</td>
<td>Explore the different contribution of words and images to meaning in stories and informative texts</td>
</tr>
<tr>
<td></td>
<td>ACELY1646</td>
<td>Literacy: Interacting with others</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Listen to and respond orally to texts and to the communication of others in informal and structured classroom situations</td>
</tr>
<tr>
<td>Year 1</td>
<td>ACELA1454</td>
<td>Language: Expressing and developing ideas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Understand the use of vocabulary in everyday contexts as well as a growing number of school contexts, including appropriate use of formal and informal terms of address in different contexts</td>
</tr>
<tr>
<td></td>
<td>ACELY 1660</td>
<td>Literacy: Interpreting, analysing, evaluating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use comprehension strategies to build literal and inferred meaning about key events, ideas and information in texts that they listen to, view and read by drawing on growing knowledge of context, text structures and language feature</td>
</tr>
</tbody>
</table>

Summary

Words are the essence of thought and communication. By shining a light on the orthography of the English language, embedded in the classroom learning, we learn to read text deeply and to write purposefully. Investigating words has an impact on what it is to be literate. We read once more Jeannie Baker’s Circle with the experiences and orthographic knowledge of cycle within us. We have come full circle.
LINKING THEORY, RESEARCH AND PRACTICE

Pete Bowers & Gail Venable

There has been a widespread call for research to identify more effective ways to include morphology in literacy instruction in elementary grades in general, and in the early years in particular (Bowers & Bowers, 2017, 2018a; P. Bowers, Kirby & Deacon, 2010; Carlisle, 2010; Carlisle & Stone, 2005; Goodwin & Ahn, 2010; 2013; Kirby & P. Bowers 2017, 2018; Rastle 2018; Reed, 2008). As part of that effort, researchers including Bowers and Bowers (2017, 2018a,b) and Rastle (2018) have specifically emphasised the need for further study of early structured word inquiry (P. Bowers & Kirby, 2010).

Few researchers or educators have witnessed morphological instruction or orthographic inquiry (structured word inquiry) in the early years. Our account provides just such a needed example. Structured word inquiry is not a program; rather, it is instruction that uses a scientific inquiry approach to build understanding of our writing system. Like any domain of science, orthographic inquiry has its own essential terminology, processes and tools for investigation. In their account, Anderson and Whiting provide researchers and teachers with a rare window into how these are used in early literacy instruction. The same terminology and practices are used with learners of all ages and abilities. We focus on early literacy, but researchers and educators will see that these same principles can be applied in other contexts.

In the final section of this chapter, we analyse specific aspects of this instruction and how they reflect well-established theory and research evidence. Researchers need a clear understanding of the factors involved in this instruction if they are going to design experiments to test their effectiveness.

Using concrete and meaningful contexts to teach understanding of abstract concepts

All orthographic study in the above classroom account is embedded in a meaningful context. The teachers chose <cycle> for investigation because it was central to their classroom study. Orthographic inquiry begins by ensuring that children have a rich understanding of the word under investigation. Children’s understanding of the word ‘cycle’ is deepened and expanded by exploring it in connection with morphologically and etymologically related words (both orally and in written form). Readers and non-readers alike engage in discussions about how these words are linked by common meanings and oral and written structures. Explicit instruction about abstract grapheme–phoneme relationships takes place within this meaningful context.

In the phonology-first approach, sets of words are chosen to illustrate one feature of orthography – common letter–sound correspondences. As a result, there are no meaning-structure connections that bind the words studied (e.g. bed, red, fed). By contrast, orthographic inquiry (structured word inquiry) targets understanding of how orthography represents the meanings of words through the interrelationship of morphology, etymology and phonology. The initial set of words Anderson and Whiting selected to investigate – cycle, bicycle and recycle – set the stage for understanding this interrelationship. Starting their study with morphological and etymological relatives of the base <cycle> does not limit their instruction to these concepts. However, it allows them to highlight morphological and etymological constraints on grapheme–phoneme relationships.

Children with little or no letter–name knowledge or grapheme–phoneme knowledge participate meaningfully in this instruction. The 4-year-old does not need to have any letter knowledge to discuss the connection between <cycle> and <bicycle> when she explains, ‘A bicycle, that goes round and round’. The fact that their target word and its relatives have one <c> that spells /s/ and one that spells
/k/ brings added focus to this grapheme. That observation launches the investigation to discover that the <c> can spell /s/ if there is an <e>, <i> or <y> following it, but that otherwise <c> spells /k/. The problem-solving aspect of this investigation heightens students’ focus on the letters and pronunciations associated with them in the context of now-familiar words.

A problem-solving orientation is inherent to structured word inquiry. This follows the instructional recommendations of Shnotz and Kürschner (2007) regarding the application of cognitive load theory (Sweller, 1988; Sweller, Merriënboer & Pass, 1998). In this well-established theory of learning, *germane processing* is the term for the cognitive processing necessary to form well-integrated schema for abstract concepts in long-term memory. Shnotz and Kürschner (2007, p.497) observe that:

> Students do not automatically invest all their available cognitive capacity . . . into extra learning activities. Instead, they decide whether they do or do not engage and how much resources they will invest. Germane cognitive load therefore depends also on general learning orientations, on affective and on motivational aspects of learning . . . Learners with high interest in the learning content will more likely adopt a higher germane load than learners with low interest.

Noticing that the words they have been studying use the <c> grapheme for two different pronunciations motivates students to think more deeply about these (abstract) grapheme–phoneme correspondences. Engaging children with the stories of the spelling and meaning of words over time (etymology) provides another meaningful context to increase the learner’s focus on letter names and grapheme–phoneme correspondences. In <cycle> and <bicycle>, the <y> grapheme is associated with two different pronunciations (/ʌɪ/ and /ɪ/ respectively). The etymology of this word shows students that the Greek word *kyklos* for ‘circle’ is the source of the <y> in all the words in the morphological family they are studying. Meaningful stories are a standard learning tool for any domain of early instruction. On what basis should researchers recommend that teachers avoid the etymological stories that deepen understanding of GPCs?

Learning that the <c> and the <y> grapheme can each spell more than one phoneme sets the stage for learning that *most* graphemes can write more than one phoneme. Studying the base spelled <cycle> and its morphological relative spelled <bicycle> introduces the fact that the spelling of a base is consistent even when its pronunciation changes. This is true of all morphemes, including prefixes and suffixes. The <s> suffix illustrates this point. Anderson and Whiting introduced the <s> suffix in their word sum for <cycles>. The children then discovered this suffix in <dogs>, <plants> and <trees>. This set of words could provide the opportunity to study the fact that the <s> suffix is pronounced /s/ in the word ‘plants’ but that this same plural-forming <s> suffix is pronounced /z/ in ‘dogs’ and ‘trees’. Despite the fact that the <s> suffix has two pronunciations, it is always spelled with an <s>, explaining why we don’t spell <cycles> with a final <z>. There is no <-z> suffix. If morphological instruction is delayed, children have no way of understanding why this /z/ phoneme is spelled with an <s>. Children who successfully apply what they are taught in phonology-first instruction make misspellings such as *<dogz>* and *<treez>*.

The <s> suffix is one of the most common English suffixes. Native English speakers use and pronounce this suffix effortlessly at the beginning of school. Children have implicit knowledge that we can make explicit through instruction. Why would we deny children access to something they understand (the plural <s> suffix in their spoken language) to help them make sense of fundamental features of their written language?
Generative instruction – understanding the whole by studying the parts

The problem of education is to make the pupil see the woods by means of the trees.

Alfred North Whitehead (1929 / 1957, p.6)

The primary focus of Anderson and Whiting’s instruction is not the specific words students encounter; their focus is building students’ understanding of their writing system. Framing the study around words from the same etymological and morphological family is generative. It allows children to understand the basic principle that morphemes use consistent spellings to mark their meaningful connections despite pronunciation shifts.

Instruction that works from a phonology-first premise recommends teaching phonological aspects of spelling before addressing other linguistic influences. If instruction in morphology and etymology is to be delayed in order to teach phonology first, children are by definition given fewer cues to GPCs than is possible when instruction addresses the interrelation of morphology, etymology and phonology.

For the phonology-first hypothesis to be a research-based conclusion, we would need evidence from teaching studies. Such studies would have to show that using a phonology-first approach results in better literacy outcomes when compared with instruction that also addresses other linguistic influences (morphology and/or etymology) from the beginning of formal instruction. As discussed earlier, we know of no such evidence.

The same orthographic principles that govern the family of < cycle > govern the entire spelling system. Research has shown that in the context of typical instruction, pronunciation shifts of morphemes across words reduce children’s spelling and reading accuracy (Carlisle & Goodwin, 2013; Carlisle & Stone, 2005). Morphological knowledge – whether implicit or explicit – is important even without pronunciation shifts. In a study of 7-year-olds, Kemp (2006) found that children spelled word-medial / z / more accurately in words with two morphemes (e.g. ‘noisy’ < noise/ + y >) than one-morpheme words (e.g. ‘busy’ < busy >). This suggests that students use spelling of a known base word to influence the spelling of its relative. These are results in studies of children who have likely had no morphological instruction. It is logical to expect that this positive effect would increase with explicit instruction in morphology and how it relates to phonology and meaning. The phonology-first hypothesis, however, leads to a rejection of this possibility – without supporting evidence. In addition, research has found that untaught morphological knowledge has a positive compensatory effect for dyslexic students (e.g. Casalis, Cole & Sopo, 2004; Elbro & Arnbak, 1996). This view is also supported by the meta-analyses of morphological instruction cited above which found significantly improved literacy outcomes for less able students.

Throughout their account of orthographic inquiry, Anderson and Whiting model an essential practice in structured word inquiry in which they refer to morphemes by spelling them, rather than pronouncing them. One benefit of this practice is that it reinforces the message that morphemes have consistent spellings, not consistent pronunciations. P. Bowers and Kirby (2010) and P. Bowers and Cooke (2012) describe how this practice builds on instructional recommendations of Carol Chomsky (1970) and cognitive load theory (Shnotz & Kürschner, 2007).

We know of no pedagogical theory or logic that supports the idea that the study of a complex domain should start by studying its abstract features. In mathematics, for example, we do not introduce the concept of addition with an abstract number sentence like 2 + 3 = 5. We use counters to provide a concrete representation that helps make sense of these abstract symbols. Through practice, the need for counters diminishes as students gain an understanding of these mathematically abstract concepts. The
approach to early literacy described by Anderson and Whiting models this same dynamic. They help their students make sense of abstract orthographic concepts by providing concrete, meaningful words in which to study them. For example, the $<s>$ grapheme can spell both /s/ and /z/. Without the context of words, this grapheme and these phonemes are abstractions. Because Anderson and Whiting explicitly teach these abstractions in word sums using plurals like ‘cycles’ or ‘plants,’ students learn why the final /z/ and /s/ phonemes in these words must be spelled with $<s>$. Words emphasised in the ‘Cycles’ unit provide the context for studying these abstract orthographic conventions. The deeper processing of orthography provoked by such instruction builds well-integrated representations of orthographic schema that reflect how the writing system works, echoing the recommendations of the lexical quality hypothesis (Perfetti, 2007). According to Perfetti, higher quality lexical representations of semantic, phonological, orthographic, morpho-syntactic (grammatical) information and the interrelation of these features facilitates ‘the rapid, low-resource retrieval of a word identity’ (Perfetti, 2007, p.359) during reading or writing.

When viewed from this perspective, the phonology-first hypothesis is shown to have several fundamental flaws when applied to teaching young children about GPCs. These include the following:

- In direct opposition to standard practice in other domains, phonology-first instruction emphasises abstract information (graphemes and phonemes) while greatly reducing or omitting the meaningful context of those abstractions
- Omitting morphological and etymological influences on grapheme choice misrepresents orthographic phonology in English
- The teaching of isolated phonics falsely creates ‘exceptions’ which children are taught as ‘sight words’ through rote memorisation. This can be expected to reduce the motivation for children to engage in the cognitive processing needed to make sense of print.

**Binding of orthographic, phonological and semantic knowledge through morphology**

According to Perfetti’s lexical quality hypothesis (2007) the process of learning to read words with automaticity depends on a reader developing well-integrated (high-quality) representations of features of oral and written words. This claim aligns with the recommendations of cognitive load theory (Shnotz & Kürschner, 2007). Perfetti identifies four distinct features of lexical quality:

- orthographic
- phonological
- morpho-syntactic
- semantic.

The fifth feature is the extent to which the first four features are bound together. Kirby and P. Bowers (2017) build on Perfetti’s lexical quality hypothesis and cognitive load theory to propose the binding agent theory of morphology. They point out that morphology is the one linguistic feature that links directly to orthographic patterns, pronunciation and meanings of words. According to this view, better morphological knowledge gained through explicit instruction can be expected to increase not only morphological knowledge, but also grapheme–phome and semantic (vocabulary) knowledge.

This theory provides a way of understanding the literacy gains observed from morphological instruction. It also provides a reason to counter the common fear that early morphological instruction will reduce
time for learning about GPCs. In both meta-analyses by Goodwin and Ahn (2010, 2013), the outcomes with the greatest effect sizes were for instruction in phonological awareness ($d = 0.49$, $d = 0.48$ respectively). The second highest effects were for teaching about morphological knowledge ($d = 40$, $d = 44$ respectively). Goodwin and Ahn (2013) reasoned:

Similar to Bowers et al. (2010), results suggest that early morphological instruction may be particularly helpful perhaps because of the synergistic relationship between phonology and morphology and the larger repertoire of root [base] and affix meanings available for use. If a reciprocal relationship exists between morphological knowledge and literacy . . . it makes sense to jump start this knowledge from an early age.

Similarly, Carlisle and Stone (2005, p.445) recommended that, ‘elementary school teachers provide explicit instruction in word reading and spelling that links phonological, orthographic, syntactic, and morphemic elements’.

The phonology-first hypothesis persists despite the lack of any evidence that including morphology from the start has any negative effect on literacy learning compared to instruction which begins with isolated phonics. In this chapter, we have shown that current evidence and theory all point in the opposite direction. We agree wholeheartedly with Rastle and colleagues that more research is needed on early morphological instruction and early structured word inquiry. Ironically, although few researchers or teachers have seen examples of the instructional practice modelled in Anderson and Whiting’s account, their practices reflect recommendations from instructional research that have been around for well over 40 years. Carlisle (2010) highlights the work of Chomsky (1970), whose classic article explains the interrelation of morphology, etymology and phonology. Chomsky explains that spellings favour consistent representation of morphemes and etymological influences over consistent representation of phonemes. She also recommends that we should investigate the effect of explicit instruction about these relationships. Carlisle writes:

‘In rereading Chomsky (1970), I realised that I had forgotten how detailed and thoughtful her suggestions were for ways that students might benefit from instruction in morphological awareness. I was further struck by how little has been done since 1970 to investigate the nature and value of instruction in morphological awareness’.

(Carlisle, 2010, p.481)

Why has morphological instruction been so under-researched? One suggestion is offered by Perfetti who argues, ‘because attention to morphology has travelled on the wake of an ascendant phonology, its importance has been a bit obscured’ (2011, p.159). One legacy from decades of phonology-first instruction is that teachers and researchers are left with a dearth of examples of the kind of instruction Chomsky called for over 40 years ago. Anderson and Whiting provide a detailed account of instruction that targets exactly this need.

P. Bowers and Kirby (2017) identify nine features of morphological instruction worthy of research:

- Integrate morphology with other aspects of literacy instruction.
- Extend morphological instruction to include etymology.
- Integrate morphological instruction with subject area learning.
- Employ an inquiry-based problem-solving approach.
- Target free and bound bases as well as affixes.
- Teach morphological families using a matrix, rather than isolated morphemes.
- Target instruction to reduce the negative effect that phonological and spelling shifts (suffixing changes) across morphologically related words have on reading and spelling.
• Explicitly teach students how morphological knowledge can help in the reading and spelling of unfamiliar words.
• Target use of morphology in interpreting sentences and paragraphs.

Our account provides examples of ways that all these instructional principles can be brought to early literacy instruction. Teachers should not wait for further research to begin applying these instructional principles themselves. The evidence from morphological meta-analyses already tells us we should be experimenting with ways to include morphology in early instruction. Researchers should study the examples provided by Anderson and Whiting, and also examples of structured word inquiry being practised in schools around the world. (See a supplementary document with links to videos of structured word inquiry in action with young students here: https://tinyurl.com/y79mrkft.)

Finally, educational policy is supposed to be driven by the best evidence from current research. That evidence counters the phonology-first hypothesis. Educational policy, therefore, should prepare teachers to include morphological instruction from the beginning of school. Moreover, through Anderson and Whiting’s account, it can be seen that the logic of the English writing system can only be explained within the interrelationship of morphology, etymology and phonology. We hope this chapter fosters more collaboration between teachers and researchers in a joint effort to identify ever more effective forms of literacy instruction that respect the true nature of English orthography.

References


