CADRE REPORT

Development of a Reading Foundational Skills Learning Progression

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December 2023

Prepared by the Center for Assessment, Design, Research and Evaluation (CADRE) at the CU Boulder School of Education.

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A CADRE Report

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December 4, 2023

Abstract

A number of foundational skills contribute to students' growth toward skilled reading. Among those is phonics knowledge, or knowledge of the relationship between alphabetic symbols in print and sounds in spoken language. We examine how phonics knowledge develops from kindergarten through third grade by considering a theory of reading development known as orthographic mapping and by examining how the difficulties of *i-Ready Diagnostic* phonics items change from grade to grade. Our analysis reveals distinctions in item difficulty between kindergarten, first grade, and second grade, while second and third grade items tend to be more similar in difficulty.

Introduction

Reading foundational skills represent an aspect of reading education that has received special attention in recent years as schools, districts, and states grapple with the results of nationwide large-scale assessments, the lingering impacts of the COVID-19 pandemic, and policy pressure to overhaul elementary reading instruction. In most state and national achievement standards, reading foundational skills refer to the prerequisite skills a student must master in order to be successful on standards involving the comprehension of literary and informational text. For example, the Common Core State Standards (CCSS) identify four reading foundational skills associated with different grade level bands: print concept skills (K-1), phonological awareness (K-1), phonics and word recognition (K-5), and fluency (3-5) (CCSS, 2010). As the CCSS emphasize, "these foundational skills are not an end in and of themselves;" instead, they are the foundation upon which children stand as they learn to make meaning from different types of texts in complex ways.

Understanding foundational skills, intentionally assessing them, and planning responsive instruction are particularly pressing goals for three main reasons. First, the most recent results from the National Assessment of Educational Progress (NAEP) paint a concerning picture of reading achievement for U.S. elementary school students, with only 33% of fourth graders nationwide scoring at or above a level considered proficient according to NAEP's benchmarks (US Department of Education, 2022). For many, including Secretary of Education Miguel Cardona, who described the scores as "appalling and unacceptable," the outcomes of the 2022 NAEP point to a crisis in reading education, one that was only exacerbated by disruptions to learning due to COVID-19 (Mervosh & Wu, 2022). The NAEP tests taken by 4th grade students focus on reading comprehension. As such, foundational skills like phonics or fluency are not explicitly being represented in the 2022 scores. However, gaps in these skills, in combination with other factors that underlie skilled reading, such as oral language development (Cervetti et

al., 2020), may well help to explain why many children perform so poorly on this assessment. This is also not a recent phenomenon, as trends in 4th grade reading performance on NAEP–already low in 2002–remained flat through 2017 and showed evidence of a decrease even before the onset of the COVID-19 pandemic[1].

In addition to the building-block role they play in reading comprehension, and therefore their salience for achievement test results like the NAEP, it is crucial to understand and intentionally assess foundational skills because of well documented associations between experiencing reading difficulties in elementary school and later school outcomes, such as high school dropout rates (e.g., Hernandez, 2011). As the grade level bands of the CCSS demonstrate, foundational skills are a key part of reading programs in these early elementary grades between kindergarten and third grade, and findings like those from Hernandez's (2011) study suggest that it is crucial for students to develop a solid base in foundational skills as this may shape how they navigate and progress through the rest of their schooling.

A final reason there is particular value in articulating a model to better understand and assess reading foundational skills involves the current movement around the Science of Reading, a body of multidisciplinary research that addresses, among other things, the basis of learning to read in the brain (e.g., Shanahan, 2020). The Science of Reading movement has inspired legislation in over thirty states that imposes new requirements about the training elementary teachers receive and/or the reading curriculum districts use (Peak, 2022). These teacher training and curriculum selection requirements all reflect a larger policy goal of ensuring that instructional practices in elementary classrooms align to the evidence base on how the people learn to read. Reading foundational skills figure prominently into this current policy and pedagogical priority in reading education, as a great deal of the scientific studies that comprise the Science of Reading have investigated how foundational skills like phonological awareness,

[1] https://www.nationsreportcard.gov/highlights/reading/2022/

phonics, and fluency develop and contribute to skilled reading (e.g., Perfetti 2011; Boyer & Ehri, 2011).

Understanding foundational skills and promoting them through targeted, evidence-based instruction is imperative because of current reading policy, because of what early reading struggles can mean for students' educational trajectories, and because of nationwide trends in reading achievement. We contend that a particular approach to growth, one that relies on learning progressions, is well-suited to this call for deeply understanding, assessing, and teaching reading foundational skills. Across many content areas, learning progressions (LPs) have emerged as a valuable way to conceptualize student learning. Beginning with a grounding hypothesis of development, LPs describe how a student's understanding of a "big picture" concept in a given domain becomes more sophisticated over time with the right curricular and instructional support (Clements & Sarama, 2004; Lobato and Walters, 2017). Rather than viewing the content of any subject as a set of discrete, decontextualized skills to be individually assessed, LPs aim to make explicit connections between different levels of understanding, charting how knowledge and skills build as students understand a topic more deeply. Our purpose in drafting an LP for reading foundational skills is to help teachers, parents, and students make sense of student learning by elucidating the types of reading behaviors, understandings, and skill sets children acquire as they progress along the developmental path toward skilled reading.

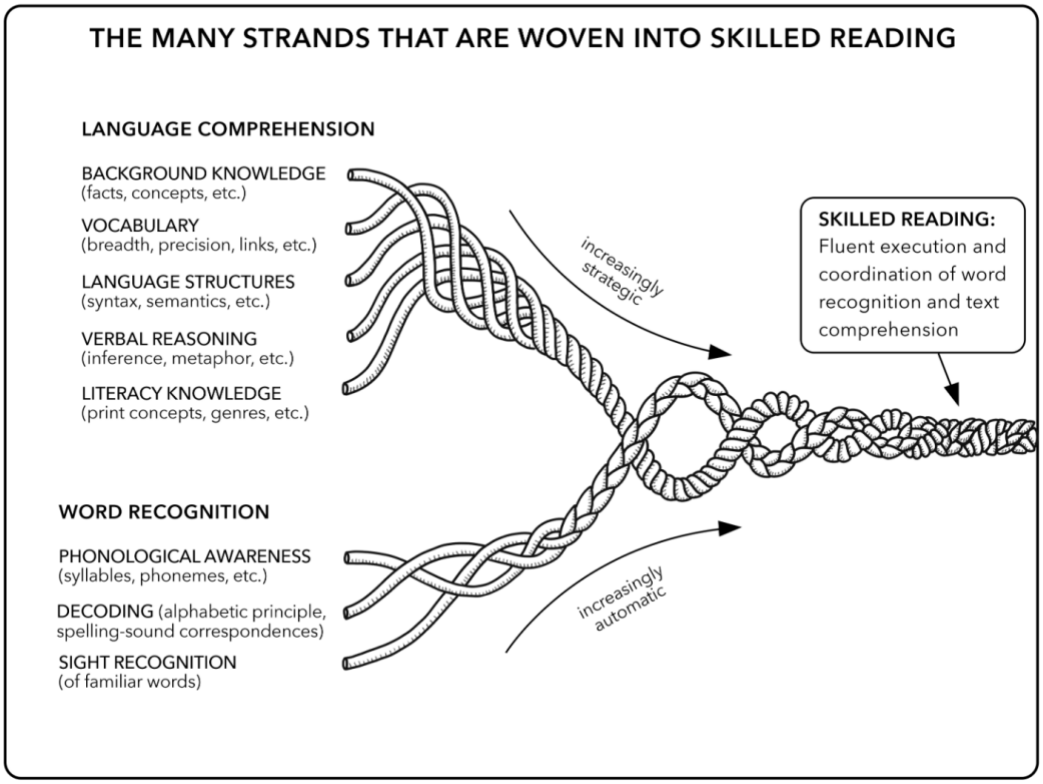
This report details how we developed a phonics LP using the results from a widely available commercial assessment, Curriculum Associates' *i-Ready Diagnostic*. In addition to detailing the LP and our process for creating it (which included feedback from two meetings with a panel of external content advisors), we share empirical results from a validation effort that involved comparing the difficulties of items associated with different grade levels and the difficulties of items associated with different placement levels within a given grade.

In the next section, we briefly review literature on theories of reading development to situate our decision to focus on the specific models of reading that guide this work. We present a theoretical argument for the phonics LP, using the work of prominent reading researchers and theorists to justify phonics knowledge as the target construct of the LP. We then introduce the phonics LP itself by summarizing the development process and drawing qualitative distinctions between each LP level with example items. After this we detail our approach for validating the LP. We provide evidence that the grade levels of our phonics LP have a moderate association with the difficulty of items across the grade levels of the i-Ready *Diagnostic* assessment's vertical scale. We conclude with ideas for formative assessment, as well as a discussion of remaining open questions for future refinement of the LP.

Literature Review

There are a variety of frameworks for reading and foundational skills that could have grounded our creation of a foundational skills LP. However, two specific, related models guided our work because of their connectedness to Curriculum Associates' reading curricula and the *i-Ready Diagnostic*: the Simple View of Reading as elaborated through Scarborough's "Reading Rope," and the Five Pillars of Reading. A familiar theoretical tool to reading researchers and practitioners, the Simple View of Reading (SVR) defines reading comprehension as the product of decoding and listening comprehension (Gough & Tunmer, 1986). The SVR supports a high-level conceptualization of the "major 'clusters' of factors that account for reading comprehension" (Pearson et al., 2022, p. 271), though it does not attempt to clarify how the various subcomponents of language comprehension and decoding interact with one another. This limitation prompted new iterations and elaborations on the SVR, including Scarborough's Reading Rope (Scarborough, 2001), which appears in Figure 1 below.

Figure 1. *Scarborough's Reading Rope*



Expanding on the label “decoding” to the larger category “word recognition,” the Reading Rope offers a model of reading that unravels many underlying factors that form SVR’s two broad, high-level constructs of decoding and listening comprehension. The word recognition strand of the Reading Rope was the most relevant to our efforts, as it encompasses the cluster of reading skills considered to be foundational by the CCSS and other academic standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). We thus arrived at Scarborough’s Reading Rope as a promising means for clarifying which foundational skills matter most (they include phonological awareness, decoding, and sight recognition) and how they contribute to skilled reading (they braid together with one another and with language comprehension).

The components and subcomponents of Scarborough’s Reading Rope map directly onto the larger topics, or domains, assessed by the *i-Ready Diagnostic*. Test items on the Reading *Diagnostic* are categorized according to the following six domains: (1) Phonological

Awareness, (2) Phonics, (3) High Frequency Words, (4) Comprehension: Informational Text, (5) Comprehension: Literature, and (6) Vocabulary. There is generally a one-to-one alignment between these *i-Ready Diagnostic* domains and sub-components of the two strands of Scarborough's Reading Rope. For example, the *Diagnostic*'s phonics domain contains items that are intended to measure students' decoding ability, which is the second subcomponent of the word recognition strand of the Reading Rope. Table 1 summarizes the remaining correspondences between *i-Ready Diagnostic* domains and subcomponents of Scarborough's Reading Rope.

Table 1. Alignment between i-Ready Diagnostic domains and Scarborough's Reading Rope

Strand from Reading Rope	Sub-Component from Reading Rope	*i-Ready* Domain
Word Recognition	Decoding	Phonics
	Sight Recognition	High Frequency Words (HFW)
	Phonological Awareness	Phonological Awareness (PA)
Language Comprehension	Vocabulary	Vocabulary
	Background Knowledge, Language Structures, Verbal Reasoning, Literacy Knowledge	Reading Comprehension

The domains of the *i-Ready Diagnostic* assessment also directly reflect the Five Pillars of Reading, the cornerstones of any effective reading program identified by the National Reading Panel's (2000) meta-analysis of various approaches to teaching children to read. The Five Pillars are: phonemic awareness, phonics, fluency, vocabulary, and comprehension (NICHD, 2000), and they can also be mapped to the *i-Ready Diagnostic* domains and accompanying Literacy Tasks. Thus, the Five Pillars, in addition to Scarborough's Reading

Rope and its antecedent, the SVR, represent a way of conceptualizing reading foundational skills that matches the overall design of the *i-Ready Diagnostic,* the assessment whose data we use to validate our foundational skills LP[2].

Theoretical Argument for a Phonics LP

The SVR, Scarborough's Reading Rope, and the Five Pillars of Reading all framed our thinking about reading foundational skills in general and in connection to the *i-Ready Diagnostic,* but in order to decide which foundational skill should be the target of an LP, we turned to larger theories of reading development. One such theory is Linnea Ehri's alphabetic phase theory, also known as the theory of orthographic mapping, which is well known in the Science of Reading movement and body of scholarship. Ehri served on the National Reading Panel in 2000 as the chair of the alphabetics subgroup (NICHD, 2000), and her theory of orthographic mapping in Science of Reading teacher training is required by many states, including the training required by Colorado's Reading to Ensure Academic Development (READ) Act. The theory of orthographic mapping explains how children learn to read words by sight, automatically, with little or no conscious effort: it happens through a connection-forming process in which the spelling, pronunciation, and meaning of specific words become bonded in a reader's memory for later automatic retrieval (Ehri, 2005a; Ehri, 2017; Kilpatrick, 2015). The "mapping" that occurs in orthographic mapping is the matching of sounds in spoken words to symbols in written words, where the way the word sounds orally, including its constituent sounds (i.e., phonemes), is the template onto which printed letters (i.e., graphemes) are mapped (Pace Miles & Ehri, 2019; Moats, 2019). The key ingredient of this mapping process, Ehri (2005b) explains, is grapheme-phoneme correspondences, or the knowledge of which

[2] These models of reading are also prominent in literature and policy on reading development, instruction, and intervention. In Colorado, for example, school districts must select reading curriculum from an advisory list of state-approved programs, which were evaluated by the Colorado Department of Education according to how well each approved program addresses each of the Five Pillars (CDE, 2022).

letter(s) represent which sound(s) in English, for these connections between graphemes and phonemes “provide the glue that bonds letters in written words to their pronunciations in memory along with meanings” (p. 172). Of the foundational skills that appear in our guiding frameworks, the construct that most centers these grapheme-phoneme correspondences is phonics, for phonics is chiefly about being able to connect sounds in spoken language to the letters they represent in an alphabetic writing system (NICHD, 2000). The insight from the theory of orthographic mapping about the glue-like function served by grapheme-phoneme connections in sight word learning, combined with the fact that phonics is the domain in which children learn these connections, provides the first layer of justification for our choice to make phonics knowledge the target construct of the foundational skills LP.

In addition, the theory of orthographic mapping, which Ehri has investigated and refined through decades of experimental studies with children, elucidates the developmental path students take as they form connections between the spellings, pronunciations, and meanings of words, utilizing their knowledge of grapheme-phoneme correspondences to retain sight words in memory. Specifically, Ehri (1999, 2005a) points to four, potentially overlapping phases through which children progress as they learn more about grapheme-phoneme connections and acquire increasingly sophisticated knowledge of the alphabetic principle, the realization that the individual sounds in spoken words are represented by letters in print (Kilpatrick, 2015). Ehri’s (2005a) four phases are: the pre-alphabetic phase, the partial alphabetic phase, the full alphabetic phase, and the consolidated alphabetic phase. What distinguishes one phase from another is the type of connection a reader forms between a word’s pronunciation and its visual properties, or spelling, as well as its meaning (Ehri, 2020). In the earliest phase, the pre-alphabetic phase, these connections exist between the visual properties of a word and the context where that word appears (e.g. the shape of the letter *m* in a McDonald’s sign); in the final phase, the consolidated alphabetic phase, the connections are between how a syllable or

morpheme is spelled and its pronunciation in spoken words (e.g. the pronunciation of *tion* in *congratulations*).

In addition, each phase is different from another in terms of the complexity and type of grapheme-phoneme connections known by children, with children in the pre-alphabetic phase making no connections between letters and sounds and children in the consolidated alphabetic phase understanding grapho-syllabic correspondences, or the idea that certain sequences of letters spell whole syllables in words (Ehri, 2005b). Because adopting an LP approach to growth depends on a hypothesis of development, Ehri's delineation of alphabetic phases was particularly important: not only did the theory of orthographic mapping illuminate that knowledge of grapheme-phoneme correspondences is a key component in sight word learning, it also points to how that knowledge might be ordered in an LP, according to the phases through which most children progress as they understand the alphabetic principle more deeply.

Orthographic mapping clarifies that knowledge of grapheme-phoneme correspondences, or phonics knowledge, is crucial and that its development follows four alphabetic phases, but what is it that catalyzes movement between those phases as children become better at reading words automatically, by sight? The answer lends additional credence to our decision to make phonics the target construct of our foundational skills LP: transitioning between alphabetic phases is supported centrally by decoding, the process of using one's knowledge of letter-sound relationships to correctly pronounce written words. Often referred to as "sounding out" a word, decoding is "ability to translate newly encountered unfamiliar printed words into their spoken equivalents," (Share, 2011, p. 47) as when a child translates the four letters slip into the four sounds they represent, /s//l//i//p/, and blends them together to say *slip.*

Decoding requires knowledge of grapheme-phoneme correspondences as well as spelling patterns; as such, it contributes to orthographic mapping. By decoding words often, children become better at aligning the individual spoken sounds in a word to the sequence of letters that represent those sounds in print, a competency that supports learning to read words

by sight. To elaborate, researcher David Share has proposed a theory known as the self-teaching hypothesis, which holds that the process of sounding out unfamiliar words through decoding focuses the reader's attention on the connections between letter sequences and spoken pronunciations, thus facilitating orthographic mapping and sight word learning. Decoding is the means by which readers "acquire the word-specific orthographic information that is the foundation of skilled visual word recognition" (Share, 2011, p. 47) and is therefore key to facilitating movement between phases.

Informed by Ehri's theory of orthographic mapping and Share's self-teaching hypothesis, the theoretical argument for our phonics LP can be summarized by the following insights:

- Orthographic mapping explains how children learn to read words by sight. It happens when the spelling, pronunciation, and meaning of words become bonded in memory.
- The "glue" that makes that bonding possible is children's knowledge of grapheme-phoneme correspondences, the way certain letter(s) represent certain sounds. This knowledge is taught and assessed in the phonics domain. The order in which the knowledge develops follows four alphabetic phases.
- Children move between phases when their knowledge of grapheme-phoneme correspondences becomes more sophisticated and when they frequently practice decoding words, which further strengthens the bond between how a word is spelled, how it is pronounced, and what it means.

Together, these are the theory-based principles that underlie the development of the LP.

The Assessment and Curriculum Context

The *i-Ready Diagnostic* is a commercially available assessment that provides information on student performance relating to grade level and national norms, creates personalized growth goals and next steps for students, and includes opportunities to monitor student growth

(Curriculum Associates, 2023). The *i-Ready Diagnostic* assessment consists of a reading standardized test and a mathematics standardized test, each of which are designed to be administered during the fall, winter, and spring of each academic school year. The tests are computer adaptive, so students complete them on a digital interface in which each new item presented to the student depends on whether they answered the previous item correctly.

Curriculum Associates also offers a number of curricular and instructional resources that can accompany and align to the *Diagnostic,* including, but not limited to personalized digital instruction for students in the areas where they need the most practice, a foundational reading skills curriculum, and a curriculum for developing strategies in reading comprehension.

A New LP for Phonics

Developing The Phonics LP

The work of Ehri (2005a) and Share (2011) was the lens through which we examined the *i-Ready Diagnostic's* items and the distinctions it makes across grade levels. Doing so allowed us to develop an LP for reading foundational skills, one in which the target construct is phonics knowledge and how it changes from grade to grade. The changes that occur across grade levels in the LP are intended to reflect *the increasing sophistication with which children can connect letters or groups of letters to the units of sound they represent in printed words*. In her description of alphabetic phases, Ehri (2005a) distinguishes how well students can make these connections in the third row of the table below, which traces growth across phases from no grapheme-phoneme (GP) connections to partial GP connections, to complete GP connections, to consolidated grapho-syllabic connections. Because our LP's focus is on phonics, it draws primarily on this third row of the table, rather than on other characteristics of children's spelling and word reading abilities in each phase.

Table 2. From Ehri (2005a), a summary of word reading and spelling abilities in each phase of development

Pre-alphabetic	Partial alphabetic	Full alphabetic	Consolidated alphabetic
May or may not know letters	Most letter shapes and names known; incomplete knowledge of GPs	Major GPs of writing system known	Grapho-syllabic spelling units known
Lack of phoneme awareness	Limited phonemic awareness; benefit of articulatory awareness instruction.	Full phonemic awareness: segmentation and blending	
No GP connections between spellings and pronunciations	Partial GP connections formed	Complete GP connections formed	Grapho-syllabic connections predominate
Sight words learned by remembering salient visual or context cues	Sight words learned by remembering partial GP connections	Sight words learned by remembering complete GP connections	Sight words learned primarily by grapho-syllabic connections
Sight word memory: unreliable, semantic errors, reading the environment	Sight word memory: confusion of similarly spelled words	Sight word memory: accurate, automatic, unitized, growing, limited mainly to shorter words	Sight word memory: accurate, automatic, unitized, expanding rapidly; multisyllabic words easier to learn
No non-word decoding ability	Little or no non-word decoding ability	Growing ability to decode unfamiliar words and non-words	Can decode unfamiliar words and non-words proficiently
Cannot analogize	Analogizing precluded by partial memory for word spellings	Some use of analogizing but limited by smaller sight vocabulary	Greater use of analogizing as sight words accumulate
Unfamiliar words predicted from context	Unfamiliar words predicted using initial letters and context	Unfamiliar words in context read by decoding; context used to confirm or disconfirm words read	Unfamiliar words in context read by decoding or analogy; context used to confirm or disconfirm words read
Words spelled non-phonetically	Partial phonetic spellings invented; weak memory for correct spellings	Phonetically accurate GP spellings invented; growing memory for correct spellings	Grapho-syllabic and GP units to invent spellings; proficient memory for correct spellings

At the earliest grade level, kindergarten, as in the theory of orthographic mapping, the connections students make between sounds and spellings are the simplest, with students using their one-to-one knowledge of which one letter stands for which one sound to spell and sound

out three- and four-letter words. By the last grade level, third grade, children's phonics knowledge has developed to the point where they know and understand the sets of letters that spell whole syllables and parts of words, and use that knowledge to spell, sound out, and think about the meaning of multisyllabic words. These changes from grade to grade reflect how students' understanding of the alphabetic principle deepens over time with instruction, as they develop increasingly sophisticated insights about the various ways in which letters represent sounds and apply those insights with greater automaticity.

In developing a foundational skills LP, we closely examined the hierarchy Curriculum Associates uses for its item design in the phonics domain. We found that hierarchy to be consistent with Ehri's (2005a) theory of orthographic mapping, particularly the four alphabetic phases through which children progress as their knowledge of spelling-sound correspondences grows to include increasingly complex grapho-phonic units. By bringing the theory of orthographic mapping to bear on *i-Ready's* grade-by-grade distinctions, we came to understand that the items answerable by kindergarteners represent the partial grapheme-phoneme connections from with the partial alphabetic phase; items answerable by first graders represent the complete grapheme-phoneme connections from with the complete alphabetic phase; and items answerable by second and third graders represent the consolidated grapheme-phoneme connections from the consolidated alphabetic phase. The pre-alphabetic phase is characterized by the absence of connections between graphemes and phonemes, and instead by connections between the pronunciation of a whole word and visually salient features of the word, such as connecting the spoken word, "look" to the eyeball-like shape of two o's. These types of connections are expected to be predominant for pre-readers in Pre-K, a grade level not included in the *i-Ready Diagnostic* or in Curriculum Associates' instructional materials.

The Phonics LP, Skills, Stimuli, and *i-Ready Diagnostic* Claims

Our method for creating this new phonics LP leveraged the *i-Ready Diagnostic's* existing conceptualizations of reading development, which are embedded in the assessment's item design blueprint. This blueprint makes explicit the distinct "claim" about the foundational skill a student appears to have mastered if they have answered a given test item correctly. Developers of the *i-Ready Diagnostic* describe phonics skills through a set of "summary" claims in grades K, 1, 2, and 3. These skills-based summary claims articulate what students in each grade know and should be able to do with their phonics knowledge, given ongoing appropriate instruction. In our estimation, the grade-by-grade groupings of summary claims reflect the transition children make as their understanding of grapheme-phoneme correspondences moves from partial to complete to consolidated, per Ehri's (2005a) alphabetic phases. In the phonics domain, there are two types of summary claims, those that describe encoding skills, in which students spell a word, and those that describe decoding skills, in which students sound out a word. Our phonics LP in Table 3 draws on *i-Ready Diagnostic* summary claims to express the encoding and decoding skills students are expected to apply in grades K-3.

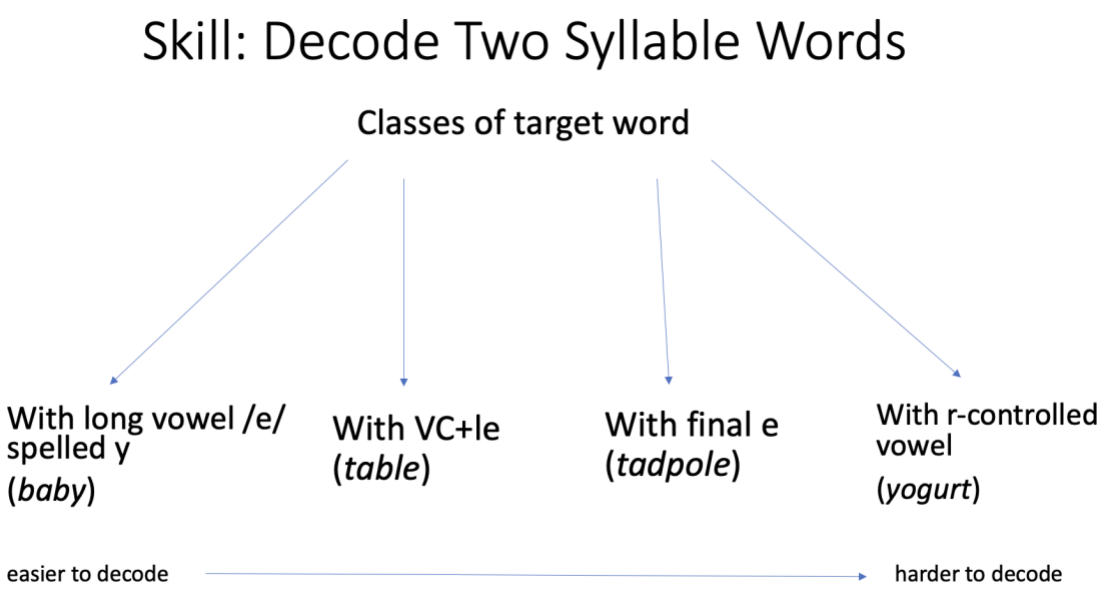
In addition to making across grade level distinctions, the *i-Ready Diagnostic's* claim structure is built to describe phonics skills more granularly. This granularity derives from a central insight about the skills represented in summary claims: namely, that there may be differences in a student's ability to apply any given skill based on characteristics of the target word they are asked to encode or decode on an *i-Ready Diagnostic* item. For example, a skill like decoding two syllable words functions differently depending on the kind–or "class"–of two syllable word a student encounters. Decoding a two-syllable word like *baby* is different from decoding a two syllable like *farthest* because of the different spelling patterns and morphemes they contain. These differences are articulated through anchor claims, more granular claims that break down summary claims by specifying the classes of target words attached to a single skill. These target words are distinguished with respect to i-Ready's placement level descriptors

of “early,” “mid,” or “late,” which would imply that target words associated with “early” tend to be easier to encode or decode than those associated with “late.” Figure 2 draws on *i-Ready* anchor claims to demonstrate how one skill can be decomposed into different classes of target words that contain different spelling pattern stimuli.

Table 3. Phonics LP of grade-by-grade encoding and decoding skills

Skills Learning Progression (Based on Summary Claims)			
Type of G-P connection	Encoding		Decoding
	Grade	Students encode one syllable words with… ➢ short vowel sounds ➢ consonant blends ➢ long vowel sounds	Students identify sound-spelling correspondences of ➢ consonants ➢ vowels Students decode one syllable words with… ➢ short vowel sounds ➢ initial consonant blends ➢ long vowel sounds
Partial	K		
Complete	1	Students encode words with… ➢ consonant digraphs ➢ final e ➢ vowel teams ➢ r-controlled values ➢ two syllables ➢ inflectional endings	Students decode words with… ➢ ending consonant blends ➢ consonant digraphs ➢ two syllables with common final syllables -y and -le ➢ final e ➢ vowel teams ➢ soft consonant sounds ➢ r-controlled vowels ➢ inflectional endings
Consolidated	2	Students encode words with… ➢ two syllables ➢ affixes Students distinguish between short and long vowel sounds when encoding similarly spelled words.	Students decode words with… ➢ silent letter digraphs ➢ inconsistent spelling-sound correspondences ➢ two syllables with short, long, and r-controlled vowels ➢ affixes in the prefix or suffix position ➢ contractions Students distinguish long and short vowel sounds
Consolidated	3	Students encode words with… ➢ multiple syllables ➢ multiple affixes	Students decode words with… ➢ multiple syllables ➢ multiple affixes Students recognize syllable sounds and syllabication patterns. Students' phonics knowledge converges with morphological awareness. They understand how parts of words contribute to overall meaning.

Figure 2. Decomposition of a phonics skills into classes of target word



The phonics LP summarizes how sets of discrete phonics skills (i.e., groups of summary claims) change from grade to grade. Each skill within a set can be broken down further by considering the distinct classes of target word students are able to encode or decode as they transition from early to mid to late stages of the skill. Thus, we can use the phonics LP to describe phonics skills in two main ways. First, it can be used to describe the way skills progress from one grade to the next, following children's increasingly sophisticated understanding of the alphabetic principle (see Appendix A for a detailed look at this progression). Second, it can be used to describe the ways in which a student may apply a single skill differently depending on the class of target word they are given (see Appendix B for details on these differences in target words).

Level Descriptions

In this section, we describe the phonics knowledge children possess at each grade level in the LP with respect to (a) the set of encoding and decoding skills present at a given grade, (b)

a single focal phonics skill, (c) the classes of target words attached to that skill, (d) an exemplar item that represents the skill, and (e) the types of knowledge and understandings that distinguish one grade level from another, based on the theory of orthographic mapping.

Kindergarten

In kindergarten, students have developed enough knowledge of the relationships between letters and sounds to apply the list of skills listed in each row of Table 4. The third column lists sample target words that would be decodable and encodable by students in kindergarten.

Table 4. Kindergarten skills and example target words

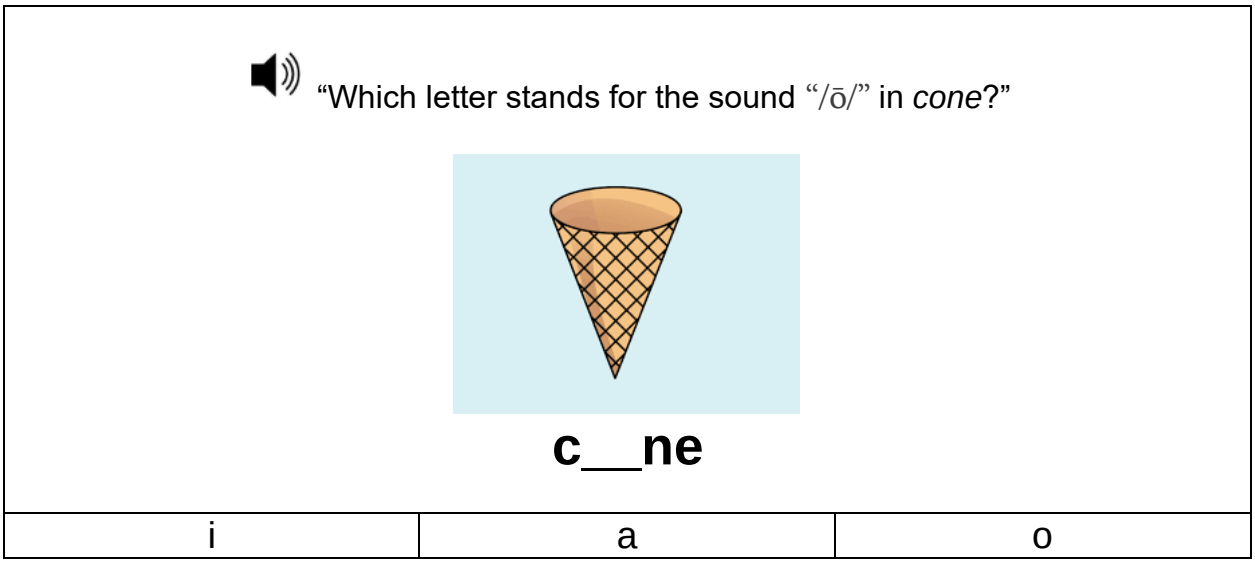
Encoding Skills		
Skill	Skill Description	Target Word
Ka.	Encode one-syllable words with a short vowel sound	men
Kb.	Encode blends in isolation and in one-syllable CCVC words beginning with consonant blends	slip
Kc.	Encode words with the long vowel sound and silent-e spelling	kite
Decoding Skills		
Kd.	Identify sound-spelling correspondences of consonants	v - /v/
Ke.	Identify sound-spelling correspondences of vowels	e - /e/
Kf	Decode one-syllable CCVC words beginning with consonant blends	frog
Kg.	Decode one-syllable words with a short vowel sound	lid
Kh.	Decode words with the long vowel sound and silent-e spelling	cone

A specific skill to highlight at this level is Kh, decoding words with long vowel sounds. This skill can be decomposed into classes of target words based on the particular long vowel

sound in the word to be decoded: long a, long e, long i, long o, or long u.

Students know that a, e, i, o, and u can spell long vowel sounds, but do not yet know the specific spelling patterns that would produce a short versus a long vowel sound. For example, when answering the exemplar item in Figure 3, a student in kindergarten would know that the letters i, a, and o can all make short or long sounds (the long sound is provided by clicking on the answer choices in Figure 3). Further, they know that the sound needed to complete the word *cone* is the long o sound, spelled by the letter o.

Figure 3, Kindergarten Skill Kh, Decode words long vowel sounds



This recognition that the letter o can spell the short vowel sound for o like in *hot* or the long vowel sound for o like in *cone* is different from knowing that the final e at the end of *cone* is what makes the o sound long in this word– knowing and being able to use the final e spelling pattern is a phonics skill that appears in first grade. Answering an exemplar item like the one in Figure 3 represents what Ehri (2005a) called partial grapheme-phoneme correspondences: a kindergarten student is demonstrating some knowledge of the sounds represented by vowels but may not yet fully understanding the mechanisms by which those sounds are produced.

Thus, a key developmental difference between the phonics knowledge of a kindergartener versus a first grader involves how fully they appreciate the connection between a long vowel sound and the spelling pattern that represents that sound in print.

First Grade

Grapheme-phoneme correspondences become more complete in first grade, as illustrated by the phonics skills listed in Table 5.

Table 5. First Grade phonics skills and example target words

Encoding Skills		
Skill	Skill Description	Target Word
1a	Encode one-syllable words ending with consonant blends	camp
1b	Encode consonant digraphs of a unique sound in isolation and in one-syllable words: th, sh, ch, wh, tch	chin
1c	Encode Vowel Sounds in words with final e	bone
1d	Encode long vowel sounds within one-syllable CVCe words	boy (oy)
1e	Encode vowel sounds formed by vowel teams or other irregular spellings within one-syllable words	tail (ai)
1f	Encode the r-controlled vowel sounds /ar/ spelled ar, /or/ spelled or, and /er/ spelled er, ir, and ur	fork
1g	Encode two-syllable words with regular syllabication patterns	open
1h	Encode words with common inflectional endings -s, -es, -ed, -ing, -er, -est	faster
Decoding Skills		
Skill	Skill Description	Target Word
1i	Decode one-syllable words ending with ck, double consonants, or blends	task
1j	Decode consonant digraphs of a unique sound in isolation and in one-syllable words: th, sh, ch, wh, tch	bath

1k	Decode two-syllable words with common final syllables -y and -le	napkin
1l	Decode long vowel sounds within one-syllable CVCe words	cone
1m	Decode vowel sounds formed by vowel teams or other irregular spellings within one-syllable words	broom (oo)
1n	Decode soft consonant sounds /s/ spelled c and /j/ spelled g	gym
1o	Decode the r-controlled vowel sounds /ar/ spelled ar, /or/ spelled or, and /er/ spelled er, ir, and ur	barn
1p	Decode words with common inflectional endings -s, -es, -ed, -ing, -er, -est	cherries

A focal skill in first grade is 1j, decode consonant digraphs of a unique sound in isolation and in one-syllable words: th, sh, ch, wh, tch. Target words for this skill can be separated into distinct classes based on the digraph they contain, representing the difference between decoding a word like *that,* which contains the digraph -th, versus decoding a word like *scratch,* which contains the digraph -tch. The exemplar item in Figure 4 provides an example of the first class of target word, requiring students to decode the word *math,* which contains the digraph -th.

Figure 4, First Grade Skill 1j, Decode consonant digraphs[3]

“Read the word. Listen to find the word you read.” **bath**		
“bat”	“bath”	“ban”

The ability to decode words with consonant digraphs hinges on a key understanding

[3] In the exemplar item in Figure 4, we have included in quotation marks the audio that would be read to students on an assessment like the *i-Ready Diagnostic*. In this kind of item, students receive the audio direction to read the target word, *math*, which is not read aloud to them. Then, they can click on the microphone icon for each answer choice to find the oral pronunciation of a word that matches the letters m-a-t-h.

about the relationships between letters and sounds, namely that combinations of two or more letters can stand for one sound, as in -th, which makes neither the /t/ nor the /h/ sound, but its own sound, /th/. Understanding this quality of consonants–the fact that they can combine to produce one sound–represents the more complete connections between graphemes and phonemes that are cultivated in first grade. Building on the knowledge that crystallized in kindergarten about how consonants in consonant blends represent distinct sounds, first graders receiving ongoing phonics instruction come to a new recognition about consonants: that two consonants do not always represent separate sounds, but can actually make one single sound together. For this focal skill, then, the difference between kindergarten and first grade students comes down to the depth of the connections they have formed between consonant graphemes and phonemes. A Kindergartner may not yet understand that consonants can combine into digraphs to produce one sound and might decode a word like *ship* by pronouncing the /s/ and /h/ sounds separately–that is why we might expect the grapheme-phoneme correspondences known by a kindergartener to be partial. In contrast, a first grader exemplifies the complete grapheme-phoneme correspondences that are characteristic of Ehri's (2005a) full alphabetic phase. Consonant digraphs represent one example of complete grapheme-phoneme correspondences: first graders have locked into memory a whole set of consonant digraphs and the single sounds they represent and can use that knowledge to decode consonant digraphs in isolation and as part of one-syllable words.

Second Grade

The phonics skills in second grade reflect students' movement toward an alphabetic phase Ehri (2005a) called consolidated, in which students form connections between longer sequences of letters and larger units of spoken language, such as syllables. Table 6 summarizes these skills and example target words for second grade.

Table 6. Level 3 phonics skills and example target words

Skill	Skill Description	Target Word
Encoding Skills		
2a	Encode two-syllable words with short vowel sounds, following the patterns VC/V, VCC/CV, and VC/CCV	visit
2b	Encode regularly spelled two-syllable words with long vowel sounds formed by CVCe syllables, vowel team syllables, and vowel + /r/ sounds	season
2c	Encode two- and three-syllable words with common prefixes and suffixes	mistreat
Decoding Skills		
2d	Distinguish long and short vowels when spelling regularly spelled one-syllable words	head vs. hear
2e	Decode consonant digraphs with a silent letter sound in one-syllable words: kn, ph, wr, gn, mb	knock
2f	Decode one-syllable words with inconsistent but common sound-spelling correspondences	bear
2g	Decode two-syllable words with short vowel sounds, following the patterns VC/V, VCC/CV, and VC/CCV	lemon
2h	Decode regularly spelled two-syllable words with long vowel sounds formed by CVCe syllables, vowel team syllables, and vowel + /r/ sounds	monkey
2i	Decode two- and three-syllable words with common prefixes and suffixes	remove
2j	Identify contractions and match them to the words they represent	didn’t

In second grade, a specific skill to highlight is decoding two-syllable words. Classes of target words are particularly important in this skill, and they can be delineated based on whether they contain short vowel sounds or long vowel sounds. This difference in stimuli represents the difference between decoding words like *lemon, mistake*, and *contain*, which are all two syllable words but include different spellings of different vowel sounds. Figure 5 displays an exemplar item for this skill that requires students to decode the two-syllable word, *monkey,* where one syllable, *key,* contains the long e sound spelled by the vowel team -ey.

Figure 5. Second grade skill 2h, decode regularly spelled two-syllable words with long vowels

monkey "Read the word. Listen to find the word you read."			
 "monk"	 "money"	 "monkey"	 "minty"

Regardless of the class of the two-syllable target word, second grade students are characterized by their ability to link groups of letters to the oral pronunciations of syllables and word chunks, rather than linking individual letters to individual sounds. When decoding the target word *contain,* for example, students might recognize the beginning syllable, *con,* as one unit, and subsequently realize that the second syllable, *tain,* includes the long /a/ sound spelled by the vowel team -ai. Importantly, students in second grade would read the syllable *con* as a singular unit, as opposed to sounding it out letter by letter. Linking letters to syllables in this way occurs when children no longer see separate letters standing for separate sounds that must be individually blended together. Instead, they have "consolidated" letters into sequences whose pronunciation and meaning can be instantly recalled (Ehri, 2005a). In this way, second graders bring their phonics knowledge to bear on a larger orthographic unit, the syllable. Rather than decoding by blending together the sounds of individual letters, they decode by blending together the pronunciation of two syllables, whose spellings they instantly recognize with no sound-by-sound consideration. Thus, a cornerstone of second grade phonics knowledge is recognizing syllables as whole grapho-phonic units. If students' phonics knowledge has not yet graduated to this recognition of how graphemes spell syllables and larger units of words, they may revert to sound-by-sound decoding, tackling the word *contain* by saying /c//o//n//t//a//n/, instead of /con//tain/. Applying this kind of sound-by-sound decoding is a strategy students may draw on when they come to chunks that they have not orthographically mapped before.

Third Grade

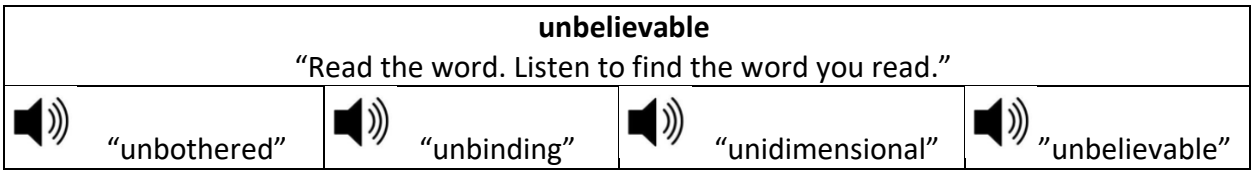
As illustrated by Table 7, with appropriate instruction and opportunities, by grade 3 students are expected to be able to apply complex phonics skills.

Table 7. Level 4 phonics skills and example target words

Skill	Skill Description	Target Word
3a	Identify syllable sounds in multisyllabic words	energetic
3b	Encode multisyllabic words with common prefixes and suffixes	unbelievable
3c	Encode multisyllabic words, including words with vowel variants	evergreen
3d	Decode multisyllabic words with common prefixes and suffixes	unbelievable
3e	Decode three-, four-, and five-syllable words	acquisition

A particularly important focal skill at this grade level is 3d, decoding multisyllabic words with common prefixes and suffixes. This skill varies across target words depending on which prefix or suffix is included in the word. For example, target words might be separated based on whether they include the common suffixes *er, or, y, mis, dis*, versus potentially more challenging affixes like *en, em, ous, bio.* Demonstrating their understanding of the connections between letters, syllables, and affixes, a third grader is prepared to tackle the exemplar item in Figure 6, decoding the word *unbelievable,* which has four syllables and two affixes, the prefix -un, and the suffix -able.

Figure 6. Third grade skill 3s, decode multisyllabic words with common prefixes and suffixes



When presented with a multisyllabic, multiple affix word like *unbelievable,* students read the base word, *believe*, as one unit, recognize the prefix -un and the suffix -able, and blend

each syllable together to pronounce *unbelievable.* Students also understand how affixes both require spelling changes to the base word (i.e., the final e in *believe* is dropped to add the -able suffix) and produce changes to the meaning of the base word (i.e., appreciating that -un means not, and -able means able to). In this way, a key feature of grade 3 phonics knowledge is not just that students can decode longer words; it is also that students' understanding of the relationships between sounds and letters has grown to the point where they know both how to spell common word parts and can appreciate how those parts contribute to the overall meaning of words. This is often called morphological awareness, children's ability to think deeply about word parts as morphemes, the smallest units of meaning in English (International Dyslexia Association, 2020). Morphological awareness supports students in applying sophisticated encoding and decoding skills. It also positions them to work with word meaning in new and important ways, by, for example, puzzling through multiple-morpheme words by identifying each morpheme, considering its individual meaning, and "blending" them together into the meaning of the whole word (International Dyslexia Association, 2017; Kruk & Bergman, 2013; Pacheco & Goodwin, 2013).

Whereas children in kindergarten were blending together individual sounds, represented by individual letters, to produce the pronunciation of a word, children in third grade are blending together word parts that they recognize as units of meaning, represented by groups of letters, to produce both the pronunciation of a word, along with its meaning. In this way, third grade represents a culmination of students' phonics knowledge: the connections they have formed are no longer between individual letters and individual sounds, as in kindergarten or even between pairs of letters and individual sounds, as in first grade. Rather, students have come to understand that groups of letters can spell common prefixes, suffixes, and whole syllables. Additionally, is important to note that students will continue to build their phonics knowledge through morphology/focusing on units of meaning as they progress through late elementary and

middle school, particular as text become more complex, including more and more multisyllabic words (Apel, 2017).

Methods

As described in previous sections, the phonics LP draws on two types of claims from the *i-Ready Diagnostic* claim structure: (a) summary claims, which are used to make across grade distinctions about the progression of general phonics skills, and (b) anchor claims, which are used to make within grade distinctions about the development of a single skill based on the target words a student must encode or decode. There are thus two layers of ordering implied by these two types of claims: an order based on how different sets of summary claims change from grade to grade, and another order based on how anchor claims detail early to mid to late stages of skills within a grade. We sought to validate both layers of ordering by comparing the difficulties of items associated with each grade's summary claims (i.e., difference in item difficulty across grade) and anchor claims (i.e., difference in item difficulty within grade).

Vertical Scale

A key feature of the i-Ready Diagnostic assessment system allowed us to make these comparisons: the vertical scale on which the items written for students at different grade levels have been calibrated. When different items are administered to students in different grades, their difficulties cannot be compared directly with proportions of correct responses, or even with the result of calibrating separate measurement models, because the groups of students being compared are at different levels of development in phonics knowledge. Yet, in order to empirically validate this learning progression, which spans several grade levels, we needed to determine the difficulty of items that were developed for students on distinct tests administered across the early grades of elementary school. The i-Ready vertical scale facilitates such comparisons. More specifically, Curriculum Associates uses the Rasch Model in concert with a

design in which students in adjacent grades answer a common set of items to calibrate a single "vertical" scale so that, for example, a kindergarten student and a first grade student with the same numeric score on the *i-Ready Diagnostic* are interpreted as having demonstrated the same level of absolute proficiency despite having taken different collections of test items (for an overview of vertical scaling, see Briggs & Weeks, 2009; Tong & Kolen, 2010).

If our hypothesized LP holds, we would expect to see the average item difficulty of phonics items increase across grade levels, because they successively require students in each grade to draw upon more complex phonics skills and knowledge to answer the items correctly. Within each grade, we would also expect to see average item difficulty increase steadily from early items to mid items to late items (i.e., we would anticipate items associated with an early anchor claim to be easier, on average, than items associated with a mid or late anchor claim). In the next section, we present initial results from our validation efforts.

Results

Table 8 overviews the number of items, anchor claims, and summary claims associated with each grade level. Kindergarten and first grade are the grade levels with the most items, compared to second and third grade. The greater number of items in these early grades could speak to the pedagogical emphasis given to phonics in K-1. Additionally, it might reflect the adaptive design of the *i-Ready Diagnostic,* in which the number of phonics items presented to a third grader depends on their response pattern in other domains, especially reading comprehension and vocabulary, while students in grades 2 and below are served the same number of phonics items. In other words, the fact that there are 122 third grade phonics items, compared to 254 kindergarten items, may point to a feature of the *Diagnostic* in which third graders only answer phonics items if their score in reading comprehension and vocabulary falls below a certain threshold.

Table 8. Number of items, anchor claims, and parent claims per grade level[4]

Grade	Items	Anchor Claims	Summary Claims
K	254	22	8
1	245	37	16
2	108	27	11
3	122	23	7

Table 8 also illustrates some patterns in summary and anchor claims across grade levels. With 16 summary claims, first grade appears to be the grade where the most decoding and encoding skills are acquired. It is also the grade with the most anchor claims, meaning that each of the 16 skills can be decomposed into classes of target words expected to become accessible to students in early, mid, and late first grade. This concentration of skills in first grade makes sense given that the transition from kindergarten to first grade involves moving from partial alphabetic understanding to full alphabetic understanding. The high number of first grade phonics summary claims illustrates the myriad of skills that become available to children when they grow from only partially understanding grapheme-phoneme correspondences to fully comprehending ways in which letter patterns represent sound.

A final consideration about summary claims involves the level of item coverage per summary claim. What we mean by item coverage is how many phonics items exist per a given summary claim in grades K-3.

Across Grade Distinctions

The design of the *i-Ready Diagnostic* implies an order for how phonics skills develop across grades. Table 9 sheds light on the empirical support for this order by providing descriptive statistics for the distributions of item difficulties by grade. The metric for item difficulty

[4] These represent a summary and anchor claim structure and item count as of the date of analysis but is subject to change.

is the location of the item on the i-Ready vertical scale. A lower location on the scale implies an easier item in absolute sense (e.g., 300); a higher location implies a more difficult item (e.g., 400).

Table 9. Descriptive statistics for the difficulties of items associated with each grade level

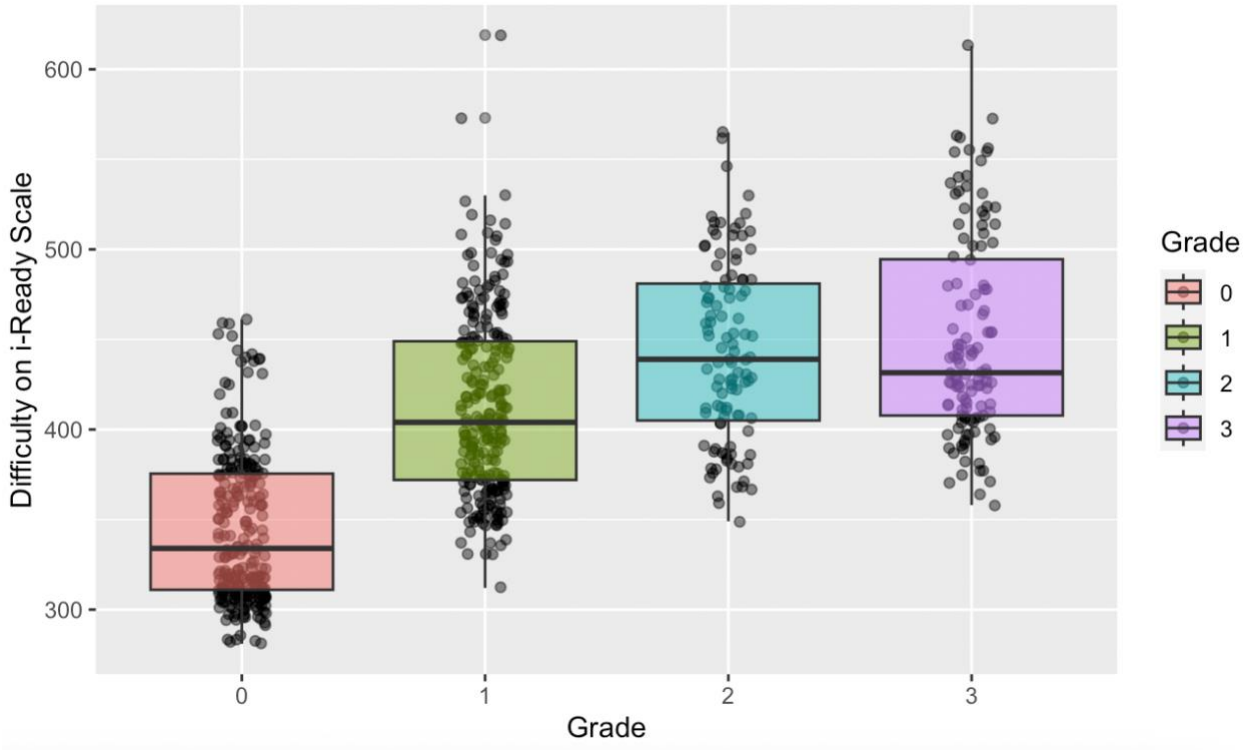
Grade	Min	Q1	Median	Q3	Max	Mean	SD
K	281	311	334	376	461	345	41.7
1	312	372	404	449	619	413	50.6
2	349	405	439	481	565	443	50.3
3	358	408	432	495	613	450	56.1

The mean item difficulty is the lowest in kindergarten and increases from grade to grade. Table 10 summarizes these differences in mean item difficulty by grade. The greatest increase in mean item difficulty occurs from grade K to 1, by 68 scale score points. Then, it increases by 30 scale score points from grade 1 to 2, and by 7 scale score points from grade 2 to 3. Thus, we see a decelerating increase in mean average item difficulty across grades such that by grade 3 there is only a minimal difference of questionable practical significance. Indeed, interestingly, the median difficulty of third grade phonics items is actually lower than the median difficulty of second grade items. Figure 7 presents the results shown in Table 9 graphically.

Table 10. Pairwise differences in mean item difficulty by grade

	K	1	2
1	68		
2	97.6	29.6	
3	105	36.9	7.3

Figure 7. Item difficulties by grade level



In Figure 7, each individual point on the plot represents the difficulty of a unique phonics item associated with any one of the four grade levels. The rank association between grade level and item difficulty is 0.66, which can be considered moderate to strong. The results summarized in Table 11 and Figure 7 suggests that although the difficulties of items show a clear progression from grade K to 2, it would be challenging to distinguish between second grade versus third grade phonics knowledge according to our learning progression solely on the basis of existing *i-Ready Diagnostic* items.

The question that emerges is: why do the distributions of second grade and third grade item difficulties look so similar, with some third grade items even appearing easier than second grade items? One explanation could return to Ehri's (2005a) alphabetic phases, recognizing that second and third grade both represent points in development at which children have consolidated grapho-syllabic units like prefixes, suffixes, and common morphemes into memory. The idea that second and third grade reflect the same alphabetic phase–the consolidated

phase–could help account for the similarity in distributions of item difficulties in these grades. The progression in item difficulties may be more pronounced from grades K to 1 and 1 to 2 because it is across these grades that students transition into different alphabetic phases, moving from partial to full to consolidated understandings of the alphabetic principle. Because phonics knowledge in both second and third grade is characteristic of the consolidated alphabetic phase, it may not be so surprising to find little in the way of a systematic distinction in the difficulty of these phonics items. It could be that once students have consolidated groups of letters that spell syllables, prefixes, suffixes, and other word chunks into memory and are able to use those skills to decode and encode multisyllabic words, the complexity of a grade 2 versus grade 3 multisyllabic target word has less of an impact on an item's difficulty. We are continuing to explore this potential explanation and others in our continuing work on this phonics LP.

Within Grade Distinctions: Order Based on Anchor Claims

Anchor claims imply an additional hypothesis about the ordering of phonics skills through the placement levels early, mid, and late. These placement levels would seem to represent intended within-grade distinctions by articulating how students are hypothesized to develop phonics skills across increasingly complex target words as they receive systematic instruction. If the hypotheses hold, then just as we would expect the difficulties of items associated with grades K through 3 to increase from grade to grade, we would expect the difficulties of items associated with placement levels to increase from early to mid to late. Table 11 and Figure 8 provides insight into these within grade progressions by presenting descriptive statistics for the distributions of item difficulties of items associated with early, mid, and late placement levels (PLs) in each grade.

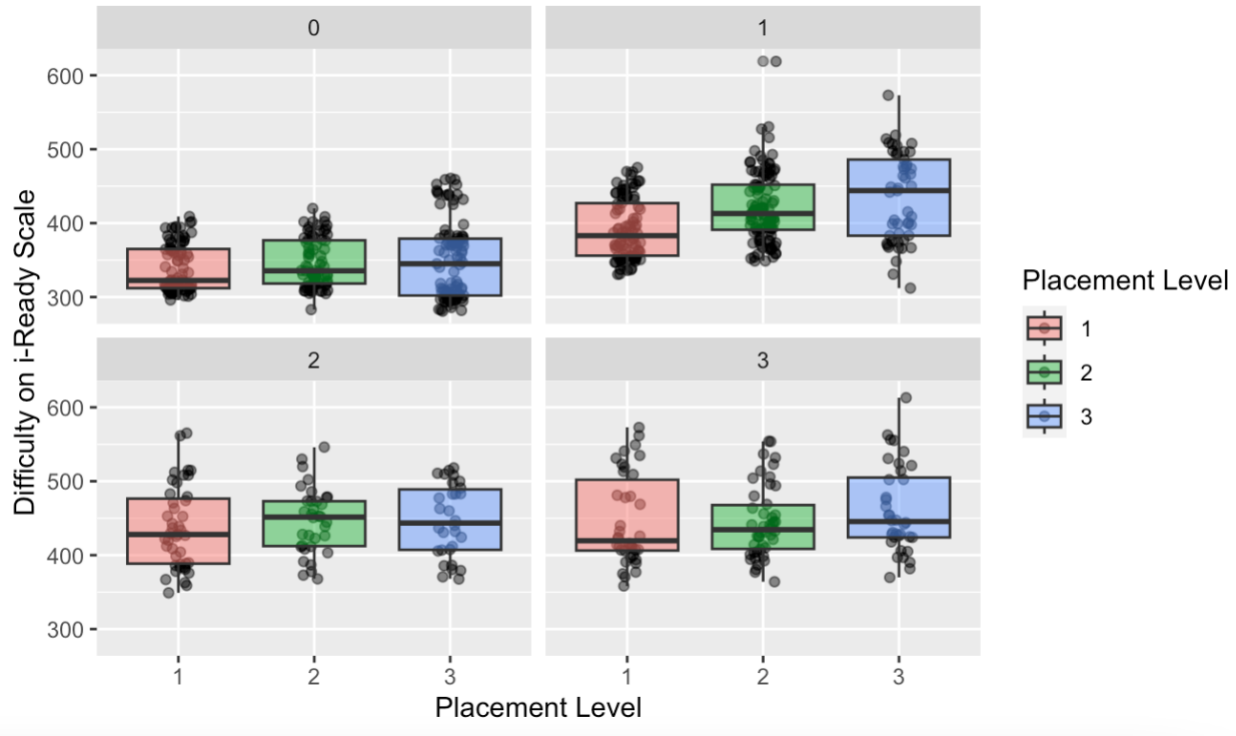
Table 11. Descriptive statistics for item difficulties of placement levels in each grade

Grade	PL	Min	Q1	Median	Q3	Max	Mean	SD
K	Early	296.0	312.0	322.5	365.0	409.0	338.9	32.2
K	Mid	283.0	318.3	335.5	376.8	420.0	346.3	33.2
K	Late	281.0	302.0	345.0	379.0	461.0	349.9	53.5
1	Early	331.0	356.0	383.0	427.0	475.0	391.3	40.4
1	Mid	349.0	391.0	413.0	452.0	619.0	421.7	47.1
1	Late	312.0	383.0	444.0	486.0	573.0	434.8	60.1
2	Early	349.0	388.5	428.0	476.5	565.0	436.8	55.6
2	Mid	368.0	412.3	451.5	473.0	546.0	446.7	44.7
2	Late	368.0	407.3	443.5	489.0	518.0	447.2	49.0
3	Early	358.0	406.3	419.5	502.0	573.0	446.6	61.2
3	Mid	364.0	408.5	434.5	467.8	554.0	444.4	48.6
3	Late	370.0	424.0	445.5	505.0	613.0	461.3	59.3

It appears that the most pronounced evidence of a within-grade progression is in first grade, where average item difficulty increases by 30.4 scale score points from early to mid items and by 13.1 scale score points from mid to late items. In kindergarten, there is a similar progression from early to mid to late, although the differences in mean item difficulties are much smaller. In second grade, average item difficulty increases by almost 10 scale score points from early to mid items, but only by 0.5 from mid to late items. In third grade there is no significant difference between early and mid items (indeed, mid items tend to be slightly easier than early items), but late items do appear somewhat harder on average (by about 15 scale score points). Note that consistent with the results shown from the across grade LP, mid and late grade 2 items have about the same average difficulty of early and mid grade 3 items. The clearest

distinction in difficulty from grade 2 to 3 comes in the contrast between grade 2 early items and grade 3 late items, but even here there is a great deal of overlap between the two distributions.

Figure 8. Item difficulties by placement level



Just as it was helpful to consider alphabetic phases in the across grade distinctions, they could be relevant for these within grade distinctions as well. The key developmental milestone that occurs for a first grader entering full alphabetic phase is unlocking complete grapheme-phoneme correspondences to more comprehensively understand the patterns of letters that represent sounds in written language. Their newfound access to complete grapheme-phoneme correspondences positions first graders to successfully complete a variety of encoding and decoding tasks, tasks that change substantially based on the class of target word to be encoded or decoded. Perhaps there is more difference in the difficulties of early, mid, and late first grade items compared to early, mid, and late second or third grade items because entering the full alphabetic phase represents a more significant turning point in children's understanding of the alphabetic principle. Thus, demonstrating knowledge of grapheme-phoneme correspondences

when they are complete (in first grade) may be more progressive than when they are consolidated (in second or third grade).

Discussion

In this report we have introduced a new learning progression for phonics, a foundational skill in the development of reading comprehension. Our empirical efforts to validate the LP involved making use of *i-Ready*'s vertical scale to compare the difficulties of *i-Ready Diagnostic* items designed for students in different grades. Our results are encouraging, as they show a moderate to strong association between grade levels and the difficulty of the test items associated with those grade levels through summary claims. We believe the phonics LP represents a promising avenue for supporting teachers, families, and students to (a) more deeply understand the progression of K-3 students' knowledge and application of phonics skills, and (b) connect that understanding to the results of an assessment like the *i-Ready Diagnostic* and more informal classroom assessments in ways that enhance classroom instruction. In this way, the vision and use case for the phonics LP centrally involves making large-scale student assessment data more meaningful and interpretable for teachers, families, and students.

Given preliminary empirical support for the way our phonics LP ordered phonics knowledge and given the widely felt need to assess foundational skills in more instructionally actionable ways, we are excited by potential uses of the LP in classroom and professional development contexts. For instance, we can imagine the LP supporting teachers in unpacking a student's *i-Ready Diagnostic* scale score, drawing on the distinctions between grade levels to explore what a students' score means in terms of the kinds of relationships between letters and sounds they may understand and may not yet understand. Further, the LP might illuminate for teachers and parents the throughlines that exist from grade to grade, helping clarify how one phonics skill builds on another and how a specific alphabetic insight may be holding a student back. Using the LP in these ways requires coordinating it with informal classroom data and

formative assessment. The ultimate vision is that the phonics LP becomes a tool for facilitating meaningful interpretations of *i-Ready Diagnostic* results while deepening parents', teachers', and students' understanding of how growth in phonics knowledge happens over time, with the right instruction.

Amid these promising directions for the LP, it is important to also state its limitations as a progression focused primarily on phonics and decoding. In their article "How the Reading for Understanding Initiative's Research Complicates the Simple View of Reading Invoked in the Science of Reading," Cervetti et. al (2020) point to the interconnectedness of decoding and listening and language comprehension, asserting that "the 'science of reading' debate, with its focus on decoding in reading instruction, may both overlook the importance of oral language and obscure the complex dynamic relations among the skills and knowledge that lead to successful comprehension" (Cervetti et al., 2020, p. 7). This issue of resisting the tendency for a focus on decoding to overshadow oral language arose in our content advisory panel discussions as well. As such, there is concern that an LP like ours, along with current reading education initiatives' emphasis on decoding and word level reading, might misrepresent or narrow all the subcomponents of skilled reading, especially ones involving language comprehension. A key strategy for mitigating this risk involves being extremely clear about the scope of the LP and its intended use as a tool that might be coordinated with formative assessment.

Formative assessment in an elementary reading classroom could happen in a variety of ways, such as observing students as they read independently, listening to them during literacy workstations, conferencing with students about what they are reading and/or writing, or gathering in the-moment-classroom data during teacher-led lessons. Whatever shape formative assessment takes, it is a key complement to this or any other LP. The phonics LP articulates the developmental path students are likely to take as their phonics knowledge becomes more sophisticated, and formative assessment provides deeper insight into the type of thinking

students engage depending on their position along the path. Thus, the phonics LP is intended to exist side-by-side with small group activities, classroom assessments, teacher observation, and formal early literacy tasks, which, together, can paint a deeper picture of students' phonics knowledge. By adding a LP to these multiple sources of information about student learning, our hope is to make it possible for teachers to more holistically understand how student thinking is growing and how instruction might be modified as a result.

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Appendices

Appendix A. Detailed Phonics Learning Progression

LP Level	Student Characteristics	Item Responses
1	Understands that: ● Printed letters stand for spoken sounds ● Each vowel can represent two sounds, short or long ● Words with consonant blends contain two separate sounds that must be blended together May not yet understand that: ● There are specific spelling patterns that produce long vowel sounds ● Sometimes two consonants make one sound	Is able to: ● Decode and encode words with short vowel sounds, long vowel sounds, and initial consonant blends ● Identify sound-spelling correspondences of consonants and long and short vowels Common errors: ● Mistaking short vowel sounds for each other, especially /e/ and /i/ ● Omitting the second consonant sound when encoding or decoding words with initial consonant blends (e.g. *fog* for *frog*)
2	Understands that: ● A digraph is two letters that produce one sound (e.g., th, sh, wh, ch) ● Long vowel sounds can be produced by final e or vowel teams ● Some consonants make soft sounds ● An r next to a vowel can change the pronunciation of the vowel sound ● The suffixes -er, -ed, -d, and -ing can be added to a base word to change its meaning or tense and sometimes require a change to the spelling of the base word ● Closed syllable words contain two syllables with short vowel	Is able to: ● Recognizing and pronouncing relevant parts of a word to decode target words, e.g.: recognizing the vowel team -oo in the middle of *broom* and using it to pronounce the four phonemes /b//r//oo//m/ ● Apply spelling rules about suffixes that requires changes to the spelling of a base word ● Pronounce and spell syllables in two syllable words containing short vowel sounds Common errors: ● Misremembering or confusing consonant digraph sounds ● Pronouncing the final e at the end of a word and a short vowel sound in the middle

	sounds (e.g., bas/ket) May not yet understand that: ● One or both syllables in two syllable words can contain long vowel sounds or r controlled vowel sounds ● Sometimes the first letter in a consonant digraph is silent	● Misremembering or confusing vowel teams and/or r-controlled vowel sounds (e.g. pronouncing short o in *born*) ● Decoding suffixes letter by letter ● Failing to apply required spelling changes to base word, e.g., spelling *babies* as babys
3	Understands that: ● In two syllable words, syllables can be spelled by short vowel sounds following the VC/V pattern, long vowel sounds following the VCe pattern or vowel teams, or r-controlled vowels ● Prefixes and suffixes are groups of letters that have pronunciations that do not need to be sounded out letter by letter ● Vowel teams can spell short or long vowel sounds (e.g. -ea makes the short sound in *head* and the long sound in *bead*) ● Words that have similar spellings can have different pronunciations (e.g. *some* versus *dome*) ● Silent digraphs are two consonants that make one sound where the first consonant in the pair is silent, such as -kn, -wr, and -gn ● Contractions represent multiple words or different kinds of words. They are governed by rules for apostrophe placement, depending on the contraction (e.g., an apostrophe represents missing letters in *can't*, a possessive noun in *girl's,* and a plural noun in *A's*) May not yet understand that: ● Prefixes and suffixes produce changes in meaning or tense to a base word	Is able to: ● Decode and encode words with two syllables with short, long, and r controlled vowels ● Decode and encode words with prefixes or suffixes ● Decode words with silent letter digraphs, inconsistent spelling-sound correspondences, and contractions ● Distinguish long and short vowel sounds by, for e.g., recognizing that -ea spells the long /e/ sound in *hear* but the short /e/ sound in *head* Common errors: ● Needing to chunk a syllable or affix into smaller parts rather than pronouncing it as a whole unit ● Misremembering spelling-sound correspondences for silent letter digraphs (e.g., pronouncing the /g/ sound in *gnaw*) ● Decoding or encoding words with inconsistent spelling-sound correspondences using regular rules (e.g., pronouncing the long vowel /o/ sound in *above* because of the final e) ● Misidentifying the multiple words represented by a contraction ● Misremembering rules for apostrophe placement by omitting or misplacing an apostrophe in a possessive noun

	● Multisyllabic words can also contain more than one affix, changing the meaning of the base word	
4	Understands that: ● Affixes produce changes to the meaning and/or tense of a base word ● It is possible to solve the meaning of an unfamiliar word by "blending" together a base word with recognizable affixes or morphemes (e.g., knowing the meaning of the affix -ate in *oxygenate* unlocks the meaning, to fill with oxygen)	Is able to: ● Decode and encode words with multiple syllables and multiple affixes ● Recognize sound and syllabication patterns by identifying which letters spell which syllables in a multisyllabic word (e.g. the letters -get spell the third syllable in *energetic*)

Appendix B. Classes of Target Word by Grade

Kindergarten		
Early	**Mid**	**Late**
Encodes words with 2 or 3 phonemes with short a and short i. Student identifies the sound-spelling correspondences of the consonants m, t, s, b, r, d, p, k, n, f, h, g. Student identifies the short vowel sounds /a/ and /i/	Encodes words with 2 or 3 phonemes with short o, short u, and short e. Student identifies the sound-spelling correspondences of the consonants l, k, v, j, w, y, x, z, q. Student identifies the short vowel sounds /o/, /u/, and /e/	Encodes 2 and 3 letter blends in isolation, including l blends, r blends, and s blends. Encodes CCVC words beginning with l-blends, r-blends, and s-blends. Encodes CCCVC or CCCVCC words beginning with s-blends. Encodes words with the long vowel sound in a-C-e, i-C-e, o-C-e, and u-C-e spelling. Decodes CCVC words beginning with l-blends and r-blends, such as plug and frog. Decodes CCVC or CCVCC words beginning with s-blends, such as slip. Decodes CCCVC or CCCVCC words beginning with s-blends, such as spring. Student identifies the long vowel sounds associated with each vowel.

First Grade		
Early	**Mid**	**Late**
Student encodes one-syllable words that begin with single-sound consonants and end	Student encodes CVCe words with long vowel sounds, such as cake or	Student encodes one-syllable words with r-controlled vowel sounds /ar/ and /or/ in the

with s-blends, such as task or n-blends, such as bent. Student encodes one-syllable words that begin with single-sound consonants and end with l-blends or m-blends, such as milk or lamp. Student encodes sounds of the consonant digraphs th, sh, ch, wh at the beginning of one-syllable CCVC words, such as chin. Student encodes sounds of the consonant digraphs th, sh, ch, ck, ng at the end of one-syllable CVCC words, such as wish. Student encodes words with the inflectional endings -s, -es, -ed, -ing that do not require a spelling change to the base word. Student decodes VCC and CVCC words that end with double consonants such as gg or ff or the consonant digraph ck, such as egg or rock. Student decodes one-syllable words that begin with single-sound consonants and end with s-blends, such as task or n-blends, such as bent. Student decodes one-syllable words that begin with single-sound consonants and end with l-blends or m-blends, such as milk or lamp. Student matches sounds of consonant digraphs to letters in isolation: th, sh, ch, wh, tch.	bone, including distinguishing between CVC and CVCe words that have similar spellings but different medial phonemes, such as cut and cute. Student encodes one-syllable words with the common vowel teams and long-vowel spellings ai (sail), ay (day), ea (bean), oa (boat), ow (tow), and y (fly). Student encodes one-syllable words with the vowel teams oo (wood, broom), ou (out), ow (brown), ew (few), oy (boy), oi (oil), and aw (law). Student encodes two-syllable words with closed syllables in a VC/CV pattern, such as napkin. Student encodes two-syllable words with open syllables in a V/CV pattern, such as open. Student encodes words with the inflectional endings -s, -es, -ed, -ing when a spelling change is required of the base word. Student decodes two-syllable words in the VC/C+le pattern, such as candle or VC+le pattern, such as table. Student decodes CVCe words with long vowel sounds, such as cake or bone. Student distinguishes between CVC and CVCe words that have similar spellings but different medial phonemes, such as cut and	final position, such as car and for or followed by final e such as store or bare. Student encodes one-syllable words with r-controlled vowel sounds /er/ spelled er, ir, and ur, such as fir, or followed by final e, such as pure. Student encodes one-syllable words with r-controlled vowel sounds and a final consonant blend, such as barn, start, born, fork, girl, or hurt. Student encodes words with the inflectional endings -er and -est. Student decodes words with /s/ spelled c or /j/ spelled g in one-syallble words, such as cent or gym. Student decodes one-syllable words with r-controlled vowel sounds in the final position, such as car, for, her, fur or followed by final e, such as store or bare. Student decodes one-syllable words with r-controlled vowel sounds and a final consonant blend, such as barn, start, born, fork, girl, or hurt. Student decodes words with the inflectional endings -er and -est.

Student identifies sounds of the consonant digraphs th, sh, ch, wh at the beginning of one-syllable CCVC words, such as chin. Student identifies sounds of the consonant digraphs th, sh, ch, ck, ng at the end of one-syllable CVCC words, such as wish. Student decodes two-syllable words with the long vowel sound /e/ spelled y, such as baby. Student decodes words with the inflectional endings -s, -es, -ed, -ing that do not require a spelling change to the base word.	cute. Student decodes one-syllable words with ee (feet). Student decodes one-syllable words with the common vowel teams and long-vowel spellings ai (sail), ay (day), ea (bean), oa (boat), ow (tow), igh (high), y (fly). Student decodes one-syllable words with the vowel teams oo (wood, broom), ou (out), ow (brown), ew (few), oy (boy), oi (oil), au (launch), and aw (law). Student decodes words with the inflectional endings -s, -es, -ed, -ing when a spelling change is required of the base word.	