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Development of a Reading Foundational Skills Learning Progression

A CADRE Report

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December 4, 2023

Abstract

$ Q X P E H U R I I R X Q G D W L R Q D O V N L O O V F R Q W U L E X W H W R V W X G H Q W
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,

$V WKH &&66 HPSKDVL]H ³WKHVH IRXQGDWLRQDO VNLOOV WKHPVHOYHV ´ LQVWHDG WKH\ DUH WKH IRXQGDWLRQ XSRQ ZKL meaning from different types of texts in complex ways.

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-

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 V W U X J J O H V F D Q P H D Q I R U V W X G H Q W V ¶ H G X F D W L R Q D O Q W U D M H F W 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)

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 DVVHVVPHQW¶V 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 RXU ZRUN EHFDXVH RI WKHLU FRQQHFWHG QDWXUH and their curricular and assessment Ready Diagnostic WKH 6LPSOH 9LHZ RI 5HDGLQJ DV HODERUDWHG WKURXJK 5RSH ´ DQG WKH)LYH 3LOODUV RI 5HDGLQJ $ IDPLOLDU WKHRU 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 RI WKH ³PDMRU µFOXVWHUV¶ RI IDFWRUV WKDW DF FRPSUHKHQVLRQ´ 3HDUVRQ HW DO S WKRXJK LW GRH various subcomponents of language comprehension and decoding interact with one another. This limitat LRQ SURPSWHG QHZ LWHUDWLRQV DQG HODERUDWLRQV RQ Reading Rope (Scarborough, 2001), which appears in Figure 1 below.

Figure 1. 6FDUERURXJK¶V 5HDGLQJ 5RSH

([SDQGLQJ RQ WKH ODEHO ³6HOHFW WR FRQWLQXH´ WR FKDQJH WKH 5HD

Our method for creating this new phonics LP leveraged the i-Ready Diagnostic existing conceptual distinctions that are designed to help define learning progressions. This LP makes explicit the skills that i-Ready Diagnostic items assess, and it describes how these skills develop over time. Each skill is defined by the set of items that assess it. Each item tests exactly one skill. This skill is the one that the student appears to have mastered if they have answered a given test item correctly.

Developers of the i-Ready Diagnostic describe phonics skills in summary claims that are used 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 i-Ready's 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 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 different demands placed on a student's ability to encode or decode a target word depending on the 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 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 levels

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 Z L W K « ¹ short vowel sounds ¹ consonant blends ¹ long vowel sounds	Students identify sound-spelling correspondences of ¹ consonants ¹ vowels Students decode one syllable words Z L W K « ¹ short vowel sounds ¹ initial consonant blends ¹ long vowel sounds
Partial	K		
Complete	1	6 W X G H Q W V H Q F R G H Z R ¹ consonant digraphs ¹ final e ¹ vowel teams ¹	

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

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

c. Deco

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

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.

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

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

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

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

each syllable together to pronounce

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 1( )5(b)11(00 0 G [( )] TJi2 BT /F1oC(n)(p)-11(h)11(o)-11 61(g)11(r)3.72 78.05

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,

Figure 7. Item difficulties by grade level

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,

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

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

Discussion 0(s)-11(s)-11(i)5(on)] TJ ET Q211(c) ET Q q 1o

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 deepe U S L F W X U H R I V W X G H Q W V ¶ 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	

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
-

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.	