

# From Learning-to-Read to Reading-to-Learn:

## Building Confident Learners

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The Learning Bar<sup>1</sup>

This paper describes the process of how children learn to read based on recent research on the science of reading. It follows a three-phase model presented by Castles, Rastle, and Nation.<sup>1</sup> It extends their work by delineating the scope of each phase, defined in terms of a core set of skills, and proposes a sequence for teaching these skills. It concludes with a discussion about how the proposed scope and sequence align with common curriculum standards.

## I. Introduction

The successful transition from Learning-to-Read to Reading-to-Learn during the first three years at school is critical to students' long-term success.

The timely transition from learning-to-read to reading-to-learn occurs for most children at about age 8 or 9. During kindergarten and the early primary years, children acquire a variety of skills; however, the focus is on 'learning-to-read'. When they begin the late primary period, which in most countries is grade 4,<sup>2</sup> the emphasis shifts to 'reading-to-learn.' The curriculum changes: it assumes that children can read fluently and understand the content of school subjects such as health, social studies, history, and science. Students begin learning the terminology and concepts of subject domains and use that knowledge to think critically, solve problems and create new knowledge. The mathematics curriculum includes 'word problems' shortly after students have learned basic mathematics facts and concepts. An inability to read fluently with confidence stymies their progress. As students continue through school and enter lower secondary, the demands for strong literacy skills increase. Students who lack the fundamental reading skills fall further and further behind.

Consequently, most students who are struggling readers at the end of primary school continue to have learning problems into lower and senior secondary school.<sup>2</sup> They are also prone to engaging in a range of risky behaviours, having low self-esteem, and experiencing anxiety and depression.<sup>3,4,5</sup> Students who do not learn to read proficiently by the end of the third grade are less likely to graduate from secondary school.<sup>6</sup>

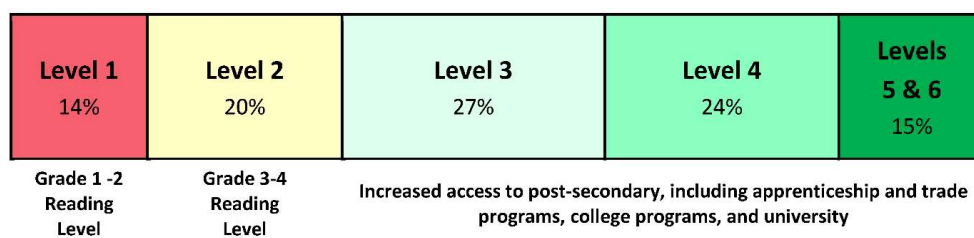
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<sup>2</sup> The terms 'preschool,' 'kindergarten,' and 'grade' are used throughout this paper. These are the most common terms used in Canada and the United States. The terms used to describe the stages of early childhood education, primary education, and lower and upper secondary vary considerably among countries. UNESCO's International Standard Classification of Education (ISCED) is the authoritative reference for classifying educational levels across countries.

## Only two in three students in high-income countries learn to read with fluency and understanding

These stark findings are evident for most high-income countries, and the results are considerably worse in low- and middle-income countries.<sup>7,8</sup> For example, since 2000, Canada has participated in the Programme for International Student Assessment (PISA), a large-scale international study of students' skills in reading, mathematics, and science at age 15.<sup>9</sup> The PISA results for reading are reported as the percentage of students scoring at each of six levels of proficiency. The 2018 PISA results found that 66% of Canadian students scored at Level 3 or higher. Those with reading skills at Level 3 and higher are more likely to be successful in pursuing a post-secondary diploma or degree at a college or university. However, 14% of Canadian students scored at Level 1 and a further 20% scored at Level 2. Level 1 skills are equivalent to about a grade 1 or 2 reading level. Level 2 skills are equivalent to about a grade 3 to 4 reading level. Students with these levels of reading skills do not have the prerequisite skills required to pursue most post-secondary programs. (See Figure 1.)



**Figure 1.** Students' level of reading achievement in Canada at age 15

Source: OECD PISA 2018

## We are stalled.

The UNESCO report, *Learning Divides*, found that for the 28 OECD countries that participated in the six cycles of PISA, from 2000 to 2015, the average change in reading scores was slightly negative, and for all countries the annual rates of growth ranged from -2.45 to 2.20 percent of a standard deviation.<sup>10</sup> These are very small changes. They correspond to effect sizes ranging from -0.0245 to 0.022. Many high-yield teaching strategies have effect sizes above 0.50, or 50 percent of a standard deviation.<sup>11</sup> The UNESCO report provides compelling evidence that we are stalled. Despite the considerable investments aimed at improving literacy skills, results have been remarkably stable for at least the last two decades.

## Children vary markedly in their cognitive and language skills when they enter kindergarten.

The challenge for educators world-wide is meeting the needs of students with diverse abilities. When children enter kindergarten, there is a four-year age range in their cognitive and language skills. In other words, if the average age of children upon school entry is 5 years in a school district, most children will have the skill levels of a typical five-year-old. Some children will have the skill level of a six-year-old, even though they are five, and some children will have the skill level of a three- or four-year old.<sup>12</sup>

Some of this variation is associated with children's birthdates and the age requirements for school entry. However, children's cognitive and language skills when they enter kindergarten are the *cumulative result* of countless factors that affect their development, beginning at conception and continuing through to the day

they begin kindergarten.<sup>8</sup> Some of the pre-natal risk factors associated with vulnerability include poor nutrition, exposure to toxins, and the mother's physical and emotional health.<sup>13</sup> During the preschool years, children's interactions with parents and other caregivers, parenting styles, and intra-family relations are critical for their development.<sup>14</sup> Family socioeconomic status and poverty play a key role during this period, as it affects parents' access to health care and preschools. In addition, the stress of living in poverty is associated with dysfunctional marital relationships, poor family functioning, maternal depression, and permissive or authoritarian parenting.<sup>15</sup>

In Canada and the United States, about 40% of children lack the early learning skills to become successful readers.<sup>16,17</sup> For a kindergarten teacher with a class of 20 students, this means that 7 or 8 students will require additional support, including instruction on foundational pre-reading skills such as concepts about print and letter knowledge.

## We need to change our approach to teaching reading during the primary years.

The approaches used to teach reading have been mired in a debate about the relative effectiveness of a 'three-cueing' approach versus a 'phonics' approach.<sup>18</sup> A three-cueing approach teaches children to use three cues when encountering a new word: the meaning of the word in the sentence's context, the grammatical features of the word, and the visual structure of the word. A phonics approach begins by teaching children the sounds associated with letters and combinations of letters. The research supporting a phonics approach is unequivocal; it stresses the importance of explicit phonics instruction during the primary grades.<sup>19,20,21</sup>

The consensus among leading researchers for adopting a phonics-based approach was documented over twenty years ago.<sup>22</sup> The Ontario Human Rights Commission maintains that it is a human right for students to be taught with a phonics-based approach.<sup>23</sup> Despite the calls for changing the way reading is taught, three-cueing is the prevailing instructional approach in North America and several other countries.<sup>24,25,26</sup>

## We need to change our approach to addressing the needs of vulnerable students.

Educators usually meet the needs of students who are at risk of not making a successful transition from learning-to-read to reading-to-learn in one of three ways. One is to retain them in either kindergarten or year 1 or grade 1, with the belief that they will be more mature and benefit from an extra year of instruction. The second is to 'wait to fail'; that is, keep children with their school-entry cohort as they proceed through the grades, hoping they will catch up during the primary school years. The third strategy is to provide some kind of 'intervention,' which normally entails additional instruction, individually or in small groups, from a special education teacher or reading specialist. All three of these approaches have negative to small effects on students' learning to read. We make a case for a three-year, whole school intervention that involves building leadership capacity among senior administrators and principals; building teacher capacity in applying the sciences of reading, teaching, and assessment to teaching reading; implementing a systematic phonics-based approach; and establishing a professional learning community (collaborative team meetings).

## II. How children learn to read

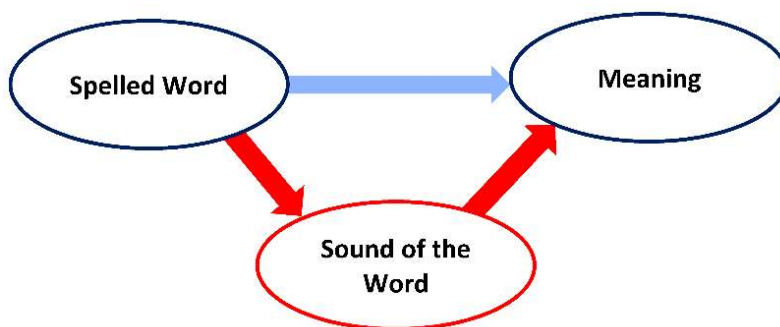
Reading is a cognitive process that involves decoding symbols to obtain meaning from text.<sup>18</sup>

Decoding is the ability to translate a word in print to its pronunciation. The most efficient way for learning how to decode words is to learn the sounds associated with letters and combinations of letters and apply these skills to 'sound out' new words. Before children can understand *what* they are reading, they need to be able to identify words accurately and efficiently and hold the information of a phrase or sentence in their working memory.<sup>27</sup> The ability to decode words is the 'critical filter' during the primary school years as most children who do not learn to read well have difficulties with decoding skills.<sup>28</sup>

The second process – obtaining meaning from text – entails forming connections with the meaning of words children have stored in memory.<sup>29</sup> Children need to understand and interpret spoken and written language when they are part of sentences or other discourse.<sup>30</sup>

Children begin learning language *in utero*, during the third trimester of pregnancy.<sup>31</sup> Shortly after birth they can distinguish between the sounds of their mother's voice and those of other females.<sup>32</sup> During infancy children perceive and attend to different sounds and begin to learn the words of their native language.<sup>33</sup> For most children, speech emerges naturally from watching and listening to their parents, caregivers and siblings, and by 12 months they are saying their first words. Thereafter, there is a rapid, exponential growth in their vocabulary.<sup>34</sup> The pace of language development differs among children and is related to their exposure to language in the home and the quality and quantity of their interactions with their parents and caregivers.<sup>35</sup> During the preschool periods there are critical periods for language and speech development, particularly for learning speech sounds (phonology) and word and sentence formation (morphology and syntax).<sup>36</sup> As children develop language, they build a 'mental dictionary' which includes a number of words. Each word in the dictionary has meaning as well as its pronunciation. It may also include some syntactical properties of words, such as whether they are a noun, verb, or pronoun, and how they are used in a sentence.<sup>37</sup>

This dual process of decoding words and obtaining meaning from them is shown in Figure 2. When children encounter a new word, they use their decoding skills to sound it out and a connection is made to a word in their mental dictionary (red arrows). After encountering a word several times, the need to decode it fades; children connect the spelled word directly to its meaning (light blue arrow). The spelled word becomes a 'sight word,' one that can be read quickly and accurately.



**Figure 2.** The dual process of learning to read in Phase 1.

## The process of learning to read can be divided into three phases.<sup>18</sup>

The first phase, *Becoming a Reader*, emphasizes *phonological awareness* – an appreciation of the sound structure of spoken words and the ability to hear, identify, and manipulate these sounds. It is an auditory skill which progresses from awareness of large-segment words and syllables (*supra-phonemic awareness*) to the awareness of individual small-segment speech sounds, which are called phonemes (*phonemic awareness*). The instructional approach for teaching letter-sound relationships and the rules for pronunciation of *written* language is called *phonics*.

The second phase, *Becoming a Skilled Reader*, requires learning a set of established conventions for writing a language, including the spelling of words and their punctuation. These conventions are referred to as orthography. Orthographic learning includes acquiring skills that go beyond phonics. It requires learning patterns within words, such as prefixes and suffixes. It can be facilitated by teaching the origin of words and how certain words are derived from a root word. This is part of a field of study called etymology.

The third phase, *Becoming an Expert Reader*, requires learning to construct meaning by interacting with a text using various strategies and integrating it with prior knowledge. These skills are broadly referred to as ‘reading comprehension’ – the ability to understand the meaning of written text. This phase is when children are reading widely to acquire subject matter knowledge, understand concepts, and apply procedures.

The three phases are shown in Figure 3. The figure depicts the first phase, *Becoming a Reader*, as the process of learning to read. The second phase, *Becoming a Skilled Reader*, is when children are making the transition from learning-to-read to reading-to-learn. The third phase, *Becoming an Expert Reader*, is when children are reading to learn.



**Figure 3.** From learning-to-read to reading-to-learn in three phases<sup>38</sup>

The diagram elucidates two points. First, the phases overlap. For example, in Phase 1, when children are developing their phonological awareness, learning letter-sound relationships, and learning how to decode words, they are also acquiring some Phase 2 and Phase 3 skills. They have begun ‘reading-to-learn.’

Second, the phases are not age- or grade-based. Imagine that Figure 3 was about learning to swim rather than learning to read. Learning to swim requires learning some basic perceptual and motor skills that enable one to swim a short distance. But to become an expert swimmer requires hours of practice. The process can begin at any age, and the time required to proceed through the first two phases will vary, depending on several factors.

A third point, which is not adequately depicted by the diagram, is that the third phase covers a long period. The core skills associated with the first two phases can be mastered by most students in one or two years, while those of the third phase are limitless. Becoming an expert reader is a life-long process.

### III. Phase 1. Becoming a Reader

#### Phase 1 skills

The primary learning objective of Phase 1 is learning how to decode words. To do this, students need to master a set of pre-reading skills referred to as ‘concepts about print’ and realize that there are systematic and predictable relationships between letters and combinations of letters that they see in print with the sounds they hear in words. This realization, that symbols represent sounds, is called the ‘alphabetic principle.’<sup>39</sup>

Students gradually build a repertoire of symbol-sound relationships, or more formally the correspondence between the graphemes and phonemes. (See Box 1.) This enables them to correctly sound out and pronounce written words. This is ‘decoding.’

**Box 1. Phonemes and graphemes**

**Phonemes**  
The sounds we hear in words

**Graphemes**  
The letters that represent the sounds in print

**ă** 96% → **a** as in **hat**  
**ai** as in **plaid**  
**au** as in **laugh**

**/b/** 97% → **b** as in **big**  
**bb** as in **rubber**

**/d/** 98% → **d** as in **dog**  
**dd** as in **daddy**  
**ed** as in **spelled**

**Phonemes** are the sounds we hear in words. The sounds are represented in print with **graphemes**, which can be a single letter or a combination of letters. Each phoneme can be mapped onto its corresponding graphemes, as shown on the right.

For example, the sound of the short vowel, **ă**, is represented 96% of the time by the single-letter grapheme, **a**, as in ‘hat’, ‘cat’, and ‘bat’. But sometimes, the sound of **ă** is represented in printed words with ‘ai’ as in ‘plaid’, or ‘au’ as in ‘laugh’.

In *Becoming a Reader* we begin with the 23 phonemes that have the letter itself as one of its graphemes. As children learn how the sounds are represented in print, they can learn how to decode and spell about one-half of all words in the English language.

As students’ decoding skills are being developed, they can learn to construct and read simple phrases and sentences. They can develop more meaningful and complex sentences if they also learn some high frequency words, such as those included in the Dolch set of 220 high-frequency words.<sup>40</sup> Several of the Dolch words can be decoded, but many are irregular, and need to be learned by sight.

#### The scope and sequence of Phase 1 skills

A systematic phonics program has well-defined scope and sequence. The scope delineates the set of skills, topics and concepts that are to be taught; the sequence is the order in which they are taught.

**Scope.** We employ the concept, ‘constrained knowledge’ to establish the scope for each phase in learning to read.<sup>41</sup> In every domain of study, there are finite sets of facts and concepts that must be learned and mastered before students can make much progress with learning objectives that require higher-order skills. This is referred to as ‘constrained knowledge.’ For example, knowing the 118 elements of the Periodic Table, along with their symbols and atomic number, might be an element of the constrained knowledge for a chemistry course. However, some skills, such as language and writing skills, are ‘unconstrained.’ They are constantly being developed throughout one’s life.



During the first phase of learning to read, students need to know the letters of the alphabet and the sounds of their language, the phonemes. The English language has only 26 letters and 44 phonemes. Children must learn these before they can efficiently decode words. We delineate the scope of Phase 1 skills as comprising the following set of skills:

1. Understanding basic concepts about print.
2. Identifying the 26 lower- and upper-case letters at a speed of 40 letters per minute.
3. Identifying and saying the sounds of the 44 phonemes at a speed of 40 phonemes per minute.
4. Reading decodable words (VC, CVC, CVCC, CCVC, and CCVCC) at a speed of 40 words per minute.
5. Reading 150 high-frequency words at a rate of 40 words per minute.
6. Spelling 150 high-frequency words.
7. Reading short sentences (3- to 10-words) comprised of decodable words and high-frequency words.
8. Reading passages of 50 to 100 words with accuracy, fluency, and comprehension. The passages have a reading level ranging from early to late grade 1.

The parameters used to define these skills, such as the rate of reading words or the number of high-frequency words, may appear somewhat arbitrary. However, they were carefully established based on norms associated with children's reading development and the standards prescribed in various state and national curricula.

Defining the scope in such exacting terms allows one to describe them as learning objectives and develop an approach for continuous assessment.

**Sequence.** When establishing a sequence for teaching Phase 1 skills, several questions arise: In what order should the letters of the alphabet be taught? Should one teach lower-case letters before upper-case letters, or teach them together? Which high-frequency words should be taught first? In what order should the letter-sound relationships be taught? When should one make the transition from teaching letter-sound correspondences to building phrases and sentences? Should one teach spelling alongside decoding? How much emphasis should be placed on language instruction? These are common questions asked by teachers, but the research does not often provide definitive answers. Our approach to establishing the order for teaching the skills in each phase is based on three principles: mastery of prerequisite skills, efficiency, and motivation. These are discussed below.

*Prerequisite skills* are skills that need to be mastered before students can learn subsequent skills. Students need to know some basic symbol-sound relationships before they can decode simple vowel-consonant (VC) or consonant-vowel-consonant (CVC) words. They need to be able to recognize several words before they can read short sentences with accuracy, fluency, and comprehension.

*Efficiency* refers to building skills that quickly maximize the number of words a student can decode. We determined an efficient order for teaching letter knowledge and symbol-sound relationships based on three criteria: the frequency of each letter in the English language, their utility in constructing VC and CVC words, and the frequency of graphemes in words that are part of young children's vocabulary. The latter criterion was based on the 'age of acquisition' (AOA) of words. AOA refers to the average age at which children typically learn a word.<sup>42</sup> We determined the frequency of each grapheme in a large corpus of words and included words with an AOA between 1.5 and 8 years of age.

*Motivation* is the third criterion used to establish sequence. A common criticism of phonics-based

approaches to teaching reading is that it is boring because students are subject to monotonous drills and worksheets before they are reading stories or creating their own stories. This can result in students lacking motivation to read.<sup>43</sup> Indeed, students who lack the necessary pre-reading skills when they enter kindergarten, and those who are in the primary grades who struggle to keep up, are prone to being demotivated, especially when it comes to reading.<sup>44</sup> Our framework for motivation is based on an extensive body of research summarized by the U.S. National Academies of Sciences, Engineering, and Medicine.<sup>45</sup> It includes three elements: self-efficacy – the sense that *“I can do it”*, values – the skill is worth pursuing, *“I want to do it,”* and interests, *“I will enjoy doing it.”*

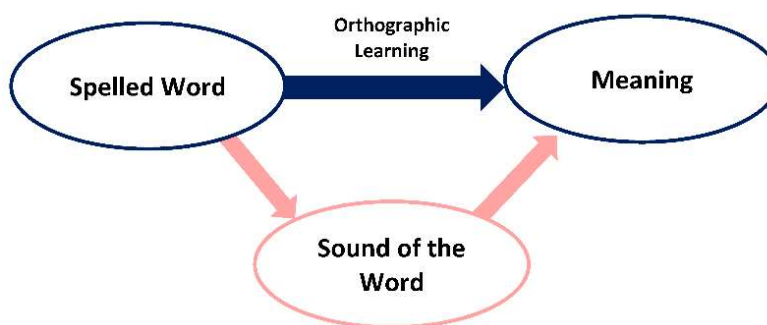
The sequence for teaching Phase 1 skills therefore calls for strategies that ensure early success while also maintaining interest. We can achieve this by separating the 44 phonemes into two sets: 23 basic phonemes which correspond to single-letter graphemes, and 21 advanced phonemes which typically correspond to graphemes with two or more letters. Basic phonemes are taught first, ordered with attention to their frequency in the English language and the number of VC and CVC words that can be formed with them. Our approach is to interweave lessons aimed at learning symbol-sound relationships, decoding words, and building a repertoire of high-frequency words with lessons that include constructing, building, and writing sentences. For example, when children learn the sounds associated with the five letters, a, r, t, n, and e, they can immediately decode ten CV and CVC words. We also introduce a small number of irregular words with each module. These include high-frequency irregular words as well as words relevant to children’s interests, such as the names of their favourite animal or super-hero. If children learn to recognize ‘I,’ ‘the,’ ‘boy,’ and ‘girl’ during the first module, they can construct some simple sentences: ‘I ran.’ ‘The rat ran.’ ‘Spider-girl ran.’ They are already reading! Writing and spelling their new words reinforces decoding skills, which can easily be embedded in activities that increase motivation.<sup>46</sup>

## IV. Phase 2. Becoming a Skilled Reader

### Phase 2 skills

The primary learning objective of Phase 2 is being able to recognize several words by sight; that is, reading them quickly without having to decode them.

In Phase 2, students hone their ability to decode words, which is facilitated by learning more of the graphemes that correspond to the 44 phonemes they learned in Phase 1. (See Box 1) The first time a student encounters a new word they can apply their skills to decode it. On each successive occasion that they encounter the word, the processing time for decoding lessens, and after a few trials the word is familiar and is recognized by sight. Students map the spelled word directly to its meaning. This is referred to as *orthographic learning*.<sup>47</sup> The diminishing reliance on decoding is represented by the pink arrows in Figure 4. The direct path from seeing a spelled word and linking it to its meaning is represented with the dark blue arrow in Figure 4.



**Figure 4.** Orthographic learning in Phase 2.

A key milestone in Phase 2 is when students begin reading independently. When students encounter a new word and successfully decode it, they are acquiring word-specific orthographic information that enables them to read strings of words quickly and effortlessly. Most children require about four instances of successfully decoding a new word to achieve automaticity.<sup>48</sup> When students read independently, they are self-teaching; they are making the transition from phonological decoding to orthographic learning.<sup>49</sup> They are making the transition from 'readers' to 'skilled readers.' (See Figure 3).

We noted earlier that as children are developing language during the preschool period, they store a mental representation of words in their 'mental dictionary.' During Phase 2, students increase their vocabulary in a more exacting way. Their representations of words are more precise in terms of their spelling, and more flexible with regards to how they can be used in different contexts.<sup>50</sup> Precision and flexibility are facilitated by learning the form and structure of words and their origin. These are called morphology and etymology.

### The scope and sequence of Phase 2 skills

In Phase 2, students increase the number of words they can recognize spontaneously with a precise and flexible understanding of their meaning. This overarching skill is facilitated by the direct instruction of

grapheme-phoneme relations (see Box 1), the form and structure of words (morphology), and the origin of words (etymology).

**Scope.** We consider the scope of Phase 2 skills to include grapheme-phoneme relationships, morphology, and etymology. The three core elements are described below.

**Grapheme-phoneme relationships.** In Phase 1, we delimited the scope by distinguishing between basic phonemes which correspond to single-letter graphemes, and advanced phonemes which typically correspond to graphemes with two or more letters. Phase 1 includes only 44 grapheme-phoneme relationships. However, there are about 220 to 225 graphemes in English. The long 'a' phoneme, ā, can appear in print with nine different graphemes. Some are quite common, such as those using a silent 'e' at the end of a word, or 'ai' as in 'wait,' while others are infrequent, such as 'ay' in 'day.' It is impractical, and undoubtedly demotivating, to teach 220 grapheme-phoneme relationships.

To delimit the scope, we identified a small set of grapheme-phoneme relationships that when learned can increase a students' access to at least 98% of all words. For example, the /f/ sound is represented with the letter 'f' about 78% of the time, but it is also represented with 'ff' (e.g., off, giraffe), 'ph' (e.g., phone, dolphin), 'lf' (e.g., half, calf), and 'gh' (e.g., laugh, rough). When we consider words that have an AOA of 8 years or less, we identified 45 words with the 'ff' grapheme, 26 with the 'ph' grapheme, 3 with the 'lf' grapheme, and 6 with the 'gh' grapheme. Thus, we included only 'ff' and 'ph' as phoneme-grapheme relationships to be explicitly taught in Phase 2.

**Morphology.** *Morphology* is the study of the form and structure of words. Words are comprised of one or more *morphemes*, which are the basic units of words that carry meaning. For example, the word 'unbelievable' is comprised of a base or root word, 'believe,' which means to accept something as true, and the prefix, 'un,' which means 'not' or 'removal,' and the suffix, 'able,' which means 'capable of.' In the same way that Phase 1 requires phonological awareness, Phase 2 requires *morphological awareness*. Students learn to recognize root words, prefixes, and suffixes, and how they affect the meaning of words. This enables them to see the underlying regularities between how words are spelled and their meaning.<sup>51,52</sup>

A frequency-based strategy was also used to establish the scope for the number of prefixes and suffixes to be taught. We use a list of 10 prefixes and 10 suffixes. These two sets include over 97% of all words with prefixes and suffixes.<sup>53</sup>

**Etymology.** Etymology is the study of the origins and historical development of words. Most English words come from Latin and Greek. When children learn the origin of words or morphemes, they can more readily grasp the meaning of many irregular words. Consider the prefix 'anti,' which is derived from Greek meaning 'against' or 'opposed to.' Learning the meaning of this prefix unlocks the meaning of several words that students may regularly encounter, such as antifreeze, antibacterial, and anti-aircraft. Teaching the etymology of words can occur alongside the explicit teaching of morphemes. Students are encouraged to become 'word detectives.'

We delimited the scope for etymology to include the meaning and origin of the 10 prefixes and suffixes for this phase, plus 20 root words from a set of high-frequency AOA words that can be manipulated with the addition of prefixes or suffixes.

**Sequence.** The sequence for teaching these three types of skills – grapheme-phoneme relationships, prefixes and suffixes, and the origin of words – is based on their frequency in texts and the AOA of words. The order is established within each type of skill.

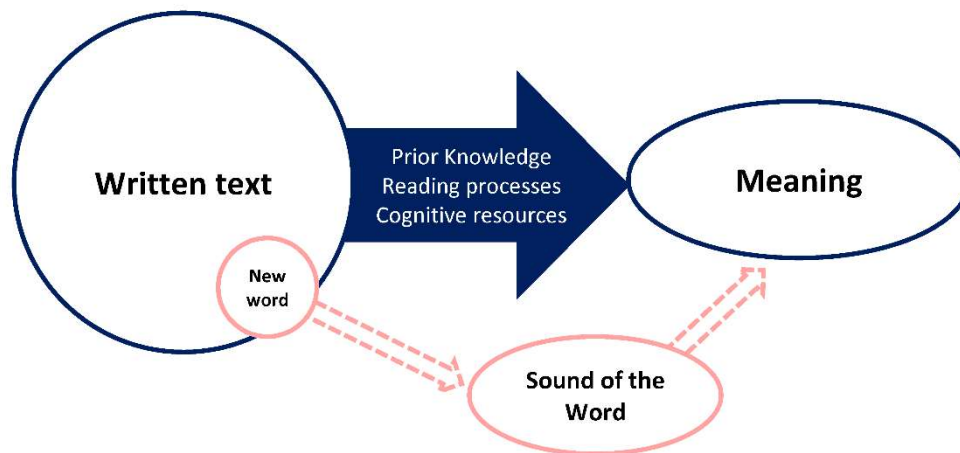
The over-arching goal of this phase is to increase the number of words students can recognize spontaneously with a precise and flexible understanding of their meaning. Therefore, acquiring these skills cannot be achieved easily without a connection to stories students are engaged in. Also, Phase 2 is when students are making the transition from learning-to-read to reading-to-learn. The approach is to engage students in short texts that are sequenced based on their reading level and interleave the three types of skills within each lesson. For example, the learning objectives of a lesson might include recognizing and sounding out words with the grapheme 'ph' and manipulating the meaning of three high-frequency words in their vocabulary using the prefix 'un'. Finally, students continue building their repertoire of high-frequency irregular words, such as those included in the 220-word Dolch list.

## V. Phase 3. Becoming an Expert Reader

### Phase 3 skills

The primary learning objective of Phase 3 is increasing students' reading comprehension. Reading comprehension is the ability to understand the meaning of written text.

Reading comprehension is achieved by interacting with text using prior knowledge, reading processes such as decoding and orthography, and general cognitive resources, including short-term memory and a broad set of executive functioning skills including planning, organizing, and setting goals.<sup>54</sup> In Phase 3, students employ decoding skills only when they encounter a word they do not know. The direct link from text to meaning is shown in Figure 5.



**Figure 5.** Reading comprehension in Phase 3.

The boundary between Phase 2 and Phase 3 is delineated by a shift in focus from orthographic learning to linguistic comprehension. Students are now reading to learn.

The widely recognized 'Simple View of Reading' maintains that reading comprehension depends upon two complementary components, decoding and linguistic comprehension. It is the product of these two components that predicts reading comprehension.<sup>55,56</sup> Linguistic comprehension refers to the ability to use information received orally, which includes words stored in one's mental dictionary, to interpret the meaning of phrases, sentences, and narratives. Reading comprehension requires the same set of skills as linguistic comprehension, but the information is received from print rather than orally.

When most children enter school, they have a base of language skills which enables them to learn to read. At age 5, the average receptive vocabulary is at least 2,000 words, and some estimates are as high as 10,000 words.<sup>57</sup> Thereafter, students acquire new words at a phenomenal rate, as many as three words per day.<sup>58</sup> However, when children start school, very few have acquired the decoding skills required to achieve Phase 2 or Phase 3 learning objectives. Decoding skills need to be explicitly taught. Thus, upon school entry, children's decoding skills lag significantly behind their language skills. For this reason, our approach is to maintain a singular focus on decoding skills in Phase 1, and gradually introduce language skills in Phase 2. In Phase 3, the focus shifts to the acquisition of language skills.

Working with sentences requires a new set of skills, which is quite extensive. For example, in this phase students learn how to parse sentences, interpret meaning in the context of a larger text, and make inferences. They learn about parts of speech and the rules of grammar. They learn the meaning of similes, metaphors, idioms, and adages. They learn about types of sentences and how to write sentences and paragraphs.

An important aspect of reading comprehension is the learner's interaction with text. The quality of that interaction depends on their prior knowledge, especially their receptive vocabulary, their ability to make inferences from what they have read, and their skills in monitoring the comprehension of what they have read.<sup>44</sup> These interactions are shown with the example in Box 2.

**Box 2. Reaching comprehension is achieved by interacting with a text.**

Alexandra is building an airplane. It is her first one and it has several parts. She can visualize how it should be put together, but she decides to follow the instructions included in the box. As she reads them, she interacts with the text in a deliberate way.

She has some prior knowledge about airplanes. For example, she knows what a fuselage is, but what do they mean when they say, "glue the cowl over the motor unit?"

Alexandra is motivated – she really wants to do this. The instructions are challenging for her, though, as they include several phrases that are commonplace only among model airplane enthusiasts. When she gets stuck and is on the verge of giving up, she draws upon some strategies she has learned. She reads the instructions again. She looks at the picture on the box several times. She pays more attention to the figures that label the parts. Finally, she makes an inference about what the instructions mean.

Before applying the glue, though, she evaluates her progress. She looks at the emerging model and reads some of the instructions that are coming next.

## The scope and sequence of Phase 3 skills

The knowledge and skills acquired in Phase 3 are unconstrained; becoming an expert reader is a lifetime endeavour. Thus, delimiting the scope and establishing a practical sequence is considerably more challenging than for the first two phases.

**Scope.** We delineate the scope of Phase 3 skills in four domains, which are described below. They are consistent with and informed by the framework set out by an international team of reading experts that developed the Progress for International Reading Literacy Study (PIRLS).<sup>59</sup>

**Explain the meaning of words.** Numerous studies have indicated a strong correlation between students' receptive vocabulary and their ability to comprehend text.<sup>60</sup> Knowing the meaning of most of the words in a text contributes directly to understanding it.

**Retrieve information from text.** Retrieving information from text requires one to identify one or more units of information at the word, phrase, and sentence level, and integrate them to understand the meaning of a text.<sup>61</sup> For beginning readers, the skill is simply to identify one piece of information that is explicitly stated, such as the main character of a story or the place where a story is taking place. At a later stage, students retrieve two or more pieces of information relevant to understanding the text.

Most curriculum standards distinguish between reading comprehension for literary texts (e.g., stories, drama, poetry) and informational texts (e.g., historical, scientific, and technical texts).

**Interpret and integrate information.** For literacy texts, students are taught the structure of a story (e.g., characters, setting, problem, events, solutions) and make interpretations, such as how a problem was solved. For informational texts, students are expected to interpret tables or graphs, understand classifications, and apply procedures.

**Make inferences.** Inferences are often about making predictions, such as “What will happen next?” or “Why did the main character behave in a certain way?” For informational text, they rely on evidence to draw a conclusion.

We limited the scope for *explaining the meaning of words* to the 300 words with the highest frequency among all words with an AOA of 8 years or less.

The scope for the other three domains was integrated, with separate objectives for literary and informational texts. Within each of these types of text there are two levels corresponding to the level of difficulty. For each type of text and level of difficulty there are objectives corresponding to retrieving information from text, interpreting information, and making inferences.

## For literary texts:

### Level 1

- Locate and retrieve one explicitly stated character, place, event, action, or idea. (Identify)
- Interpret how the problem or central idea is related to events and the conclusion. (Interpret)
- Make inferences about how certain actions led to events or a problem. (Infer)

### Level 2

- Locate and retrieve two explicitly stated elements associated with the character, place, action, or idea explain how they are related. (Identify)
- Identify pieces of evidence and provide examples pertaining to causal relationships or the solution. (Interpret)
- Explain why the feelings and motivation of the characters of a story led to certain events or actions and make predictions about what will happen next in a story. (Infer)

## For informational texts:

### Level 1

- Locate explicitly stated information from simple texts relevant to the subject. (Identify)
- Interpret causal relationships among two pieces of evidence. (Interpret)
- Make straightforward inferences about the causal relationships and the application of procedures. (Infer)



## Level 2

- Locate two or more pieces of explicitly stated information from a relatively complex text relevant to the subject. (Identify)
- Understand how to order procedures, classify objects, and explain models. (Interpret)
- Provide factual explanations of a phenomenon based on evidence. (Infer)

We use the labels, 'identify', 'interpret', and 'infer' as a shorthand for the three types of objectives. Many of the classroom lessons for Phase 3 include exercises in which students are presented with a passage and asked three or more questions that require them to retrieve information, interpret it, and make inferences. This format is used in most state, provincial, and international assessments.

## VI. Alignment of the three phases with curriculum standards

A 'curriculum' is a plan for instruction that includes a description of the content to be taught and what students are expected to learn. It is broader than a set of learning objectives, as it includes the books, lesson plans, and other learning resources to be used in a course. A curriculum also identifies the general competencies students require to achieve learning objectives and the assessments used to evaluate what they have learned.

'Standards' are a core element of most curricula. They specify in an exacting form what students are expected to know and be able to do. Standards are like learning objectives.<sup>62</sup> The standards for virtually all curricula are described in terms of grade-based norms. For example, standards usually begin with statements like "By the end of grade 1, ..." Some curricula provide guidance on how the content can be modified to meet the needs of students with varying levels of ability.<sup>63</sup>

Most standards have embraced the recommendations of the U.S. National Reading Panel, which called for instruction in five domains, the so-called "Big Five": phonemic awareness, phonics, fluency, vocabulary and reading comprehension.<sup>64</sup>

For example, the U.S. Common Core State Standards for language arts includes standards for reading, writing, speaking and listening, and language. The standards for reading have four domains – print concepts, phonological awareness, phonics and word recognition, and fluency. The standards for kindergarten to grade 2 cover most of the core skills of Phases 1 and 2 (see Figure 4.) The standards for grade 3 include four standards relevant to phonics and word recognition, but only three standards are relevant to Phase 3 skills, and these are stated in general terms. The Common Core Standards also include a set of standards relevant to language acquisition. Those standards comprise many of the concepts that we consider to be Phase 3 skills, such as using conventions of standard English, learning the meaning of words, understanding figurative language, word relationships, and a wide range of academic and subject-specific words.

An important distinction between the three-phase approach set out in this paper and the approach of the Common Core Standards is whether the learning objectives are age- or grade-based. The Common Core Curriculum, like most curricula worldwide, is grade-based. It uses terms such as: "Read grade-level text with purpose and understanding" and "Recognize and read grade-appropriate irregularly spelled words." This approach establishes expectations or 'standards' for teachers at each grade level, but it can also result in many students being labelled as 'struggling readers' or 'dyslexic' before they have received phonics-based instruction.

Our approach does not refer to age or grade norms. Every child is simply on the pathway to learning to read. Given that there is a four-year age range in language and cognitive skills when students enter kindergarten, every student has a different starting point. Students' rates of progress during the period from kindergarten to grade 3 also vary substantially.<sup>65</sup> Thus, all students begin with the same learning objectives. This makes it possible for students who are newcomers and learning to read in English for the first time, or students who did not become a skilled or expert reader during the primary grades, to follow a curriculum with a consistent scope and sequence. Teachers can quickly determine which students need extra support and how this can be provided within an inclusive classroom.

Print Concepts	
<b>1.</b>	<b>Demonstrate understanding of the organization and basic features of print.</b>
a.	Follow words from left to right, top to bottom, and page by page. <i>kindergarten</i>
b.	Recognize that spoken words are represented in written language by specific sequences of letters. <i>kindergarten</i>
c.	Understand that words are separated by spaces in print. <i>kindergarten</i>
d.	Recognize and name all upper- and lowercase letters of the alphabet. <i>kindergarten</i>
e.	Recognize the distinguishing features of a sentence (e.g., first word, capitalization, ending punctuation). <i>Grade 1</i>
Phonological Awareness	
<b>2.</b>	<b>Demonstrate understanding of spoken words, syllables, and sounds (phonemes).</b>
a.	Recognize and produce rhyming words. <i>Kindergarten</i>
b.	Count, pronounce, blend, and segment syllables in spoken words. <i>kindergarten</i>
c.	Blend and segment onsets and rimes of single syllable spoken words. ( <i>kindergarten</i> )
d.	Isolate and pronounce the initial, medial vowel, and final sounds (phonemes) in three-phoneme (consonant-vowel-consonant, or CVC) words. (This does not include CVCs ending with /l/, /r/, or /x/.) <i>kindergarten</i>
e.	Add or substitute individual sounds (phonemes) in simple, one-syllable words to make new words. <i>kindergarten</i>
f.	Distinguish long from short vowel sounds in spoken single-syllable words. <i>Grade 1</i>
g.	Orally produce single-syllable words by blending sounds (phonemes), including consonant blends. <i>Grade 1</i>
h.	Isolate and pronounce initial, medial vowel, and final sounds (phonemes) in spoken single-syllable words. <i>Grade 1</i>
i.	Segment spoken single-syllable words into their complete sequence of individual sounds (phonemes). <i>Grade 1</i>
Phonics and Word Recognition	
<b>3.</b>	<b>Know and apply grade-level phonics and word analysis skills in decoding words.</b>
a.	Demonstrate basic knowledge of one-to-one letter-sound correspondences by producing the primary sound or many of the most frequent sounds for each consonant. <i>kindergarten</i>
b.	Associate the long and short sounds with common spellings (graphemes) for the five major vowels. <i>kindergarten</i>
c.	Read common high-frequency words by sight (e.g., <i>the, of, to, you, she, my, is, are, do, does</i> ). <i>kindergarten</i>
d.	Distinguish between similarly spelled words by identifying the sounds of the letters that differ. <i>kindergarten</i>
e.	Know the spelling-sound correspondences for common consonant digraphs. <i>Grade 1</i>
f.	Decode regularly spelled one-syllable words. <i>Grade 1</i>
g.	Know final -e and common vowel team conventions for representing long vowel sounds. <i>Grade 1</i>
h.	Use knowledge that every syllable must have a vowel sound to determine the number of syllables in a printed word. <i>Grade 1</i>
i.	Decode two-syllable words following basic patterns by breaking the words into syllables. <i>Grade 1</i>
j.	Read words with inflectional endings. <i>Grade 1</i>
k.	Distinguish long and short vowels when reading regularly spelled one-syllable words. <i>Grade 2</i>
l.	Know spelling-sound correspondences for additional common vowel teams. <i>Grade 2</i>
m.	Decode regularly spelled two-syllable words with long vowels. <i>Grade 2</i>
n.	Decode words with common prefixes and suffixes. <i>Grade 2</i>
o.	Identify words with inconsistent but common spelling-sound correspondences. <i>Grade 2</i>
p.	Recognize and read grade-appropriate irregularly spelled words. <i>Grade 2</i>
q.	Identify and know the meaning of the most common prefixes and derivational suffixes. <i>Grade 3</i>
r.	Decode words with common Latin suffixes. <i>Grade 3</i>
s.	Decode multisyllable words. <i>Grade 3</i>
t.	Read grade-appropriate irregularly spelled words. <i>Grade 3</i>
Fluency	
<b>4.</b>	<b>Read with sufficient accuracy and fluency to support comprehension.</b>
a.	Read emergent-reader texts with purpose and understanding. <i>kindergarten</i>
b.	Read grade-level text with purpose and understanding. <i>Grade 1</i>
c.	Read grade-level text orally with accuracy, appropriate rate, and expression on successive readings. <i>Grade 1</i>
d.	Use context to confirm or self-correct word recognition and understanding, rereading as necessary. <i>Grade 1</i>
e.	Read grade-level text with purpose and understanding. <i>Grade 2</i>
f.	Read grade-level text orally with accuracy, appropriate rate, and expression on successive readings. <i>Grade 2</i>
g.	Use context to confirm or self-correct word recognition and understanding, rereading as necessary. <i>Grade 2</i>
h.	Read grade-level text with purpose and understanding. <i>Grade 3</i>
i.	Read grade-level prose and poetry orally with accuracy, appropriate rate, and expression on successive readings. <i>Grade 3</i>
j.	Use context to confirm or self-correct word recognition and understanding, rereading as necessary. <i>Grade 3</i>

**Figure 6.** U.S. Common Core State Standards for foundational reading skills kindergarten to grade 2

## VII. Conclusions

This paper strives to elucidate the process of how children learn to read following the three-phase model set out by Castles, Rastle, and Nation.<sup>66</sup> For each phase, we indicate how the learning objectives can be constrained to a usable set and taught in a specified sequence. Identifying the scope and sequence for each phase is at the heart of systematic phonics. It lays the foundation for building lesson plans and creating assessments that inform classroom instruction.

Many state and provincial governments have revised their curricula to include phonological awareness, word decoding, morphology, and reading comprehension. These new curricula call upon teachers to embrace an extensive set of learning objectives, build new lesson plans, increase their repertoire of effective teaching strategies, assess students in new ways, and support students with special needs in inclusive classrooms. This is a tall order.

The adoption of a new approach to teaching reading requires more than a new curriculum and a government edict. At the district and school levels, long-standing political and commercial relationships are firmly entrenched, and teachers have few incentives to change their daily routines.<sup>67</sup> A call for a change in the approach to teaching reading can be perceived by teachers as a criticism of their practice, that they are personally responsible for the failure of many students. Thus, many will resist the change.

A large Canadian school division, in partnership with The Learning Bar, has been striving to effect change in students' reading outcomes with a comprehensive intervention. Some of the lessons learned so far are summarized below.

**Leadership development.** Superintendents and principals are the principal actors for effecting change. Improving school outcomes is virtually impossible without their commitment to the change process.

**A shared vision.** Change begins with a shared vision. The priority is to establish a consensus among key stakeholders about the goals of the intervention and communicate this across all levels of the system.

**Measurable goals.** The intervention aims to attain specific, measurable goals for the first and subsequent years. The goals pertain specifically to students' reading outcomes and are defined in terms of specific skills to be achieved, rather than reaching grade-level norms.

**Population data.** Setting measurable goals requires baseline data for all students on their reading skills at a granular level. Schools that completed a baseline assessment of foundational reading skills during the first few weeks of school tended to make the most progress in improving students' reading outcomes.

**Instructional improvement.** Long-term sustainable improvement requires building teachers' instructional capacity. In every school there are teachers who embrace change. As they adopt new approaches to teaching, they quickly witness improvements in students' skills. Their effort and early successes become the catalyst for a change in school culture and the diffusion of best practice. Teachers who resist change are more willing to adopt new approaches if they are supported with professional learning and relevant resources, including lesson plans and mentorship. All teachers are more willing to engage in professional development when there is a well-defined set of learning objectives improving their skills.

**Continuous assessment.** The regular collection of data on students' performance can motivate teachers. It also enables teachers, principals, and senior administrators to monitor progress towards achieving short- and long-term goals.

**Professional Learning Community.** A professional learning community is an ongoing process with the singular purpose of giving all children the opportunity to thrive. The process increases teacher efficacy – the belief that they can engage students in learning and achieve learning goals, even for the most challenging students<sup>68</sup> – and *collective efficacy* – teachers share the belief that together they can improve student learning and well-being, even when they are working in the most demanding contexts.<sup>69</sup>

**It takes time.** Transforming schools can take three to five years.<sup>70,71</sup> It requires a concerted effort by educational leaders to change the organizational practices of the school and build teacher capacity. The motivation and momentum to transform a school is maintained with regular monitoring of progress towards the long-term goals and regular celebrations of milestones achieved.

Current levels of vulnerability in most high-income countries range from about 30% to 35%. A realistic and attainable goal is to reduce levels of vulnerability to 20% in five years. To achieve this, the development of children's reading skill during the primary school period must be a priority for all schools. It will also require concerted investments to support educational leaders and teachers.

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