International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 15, Issue 7, 2021

The Literacy Component Model: A Pragmatic Universal Paradigm

Bruce Allen Knight[a], **Susan Galletly**[b], **Kerry Therese Aprile**[c] [a]Central Queensland University, Australia; University of Ostrava, Czech Republic, [b]Private Speech Pathologist, Australia, [c]Central Queensland University, Australia

The Simple View of Reading (SVR; Gough & Tunmer, 1986; Hoover & Gough, 1990), a well-established model used widely in reading research, states that reading comprehension builds from two relatively independent subskills, word-reading skills and language skills. By not including writing and key literacy-processing skills, the SVR lacks power as a universal model to guide instruction. This article proposes the Literacy Component Model (LCM) that the authors have adapted by including writing with the SVR to highlight five key literacy components, namely: reading comprehension, word reading, language skills for literacy, word writing, and written expression. Additionally, it includes phonological, orthographic, visual, and automatising subskills of word reading and word writing, as important impacting factors. Already used successfully with practitioners, the LCM is a flexible pragmatic paradigm supporting an understanding of literacy development across different orthographies.

Key words: *Literacy Component Model, Reading, Language, Pragmatic Paradigm*

INTRODUCTION

The Simple View of Reading model (SVR; Gough & Tunmer, 1986; Hoover & Gough, 1990) states that reading comprehension builds from two relatively independent components, word reading and language comprehension skills, such that *Reading Comprehension = Word Reading x Language Comprehension*. It was proposed in Gough and Tunmer's 1986 seminal paper (Gough & Tunmer, 1986, p.6):

> *To clarify the role of decoding in reading and reading disability, a simple model of reading is proposed, which holds that reading equals the product of decoding and comprehension. It follows that there must be three types of reading disability, resulting from an inability to decode, an inability to comprehend, or both. It is argued that the first*

is dyslexia, the second hyperlexia, and the third common, or garden variety, reading disability.

Hoover and Gough's (1990) subsequent study of skills distribution established the SVR's rigour. From that time a plethora of SVR research has ensued, exploring and establishing its validity (Bonifacci & Tobia, 2017; Catts, Herrera, Nielsen, & Bridges, 2015; Joshi, Ji, Breznitz, Amiel, & Yulia, 2015; Kim, 2017; Silverman, Speece, Harring, & Ritchey, 2013; Tunmer & Chapman, 2012); and using it as a rationale for research and instruction. The strong relationship of word-reading proficiency to reading comprehension proficiency is well established, being strongest in beginning readers, then diminishing as word-reading becomes proficient (Hogan, Adlof, & Alonzo, 2014). In its 1980s context of Whole Language philosophy disparaging word reading's role, the SVR powerfully highlighted word-reading's partnership with language skills.

The model's dominance has continued unabated. "It is by far the single most widely used framework for conceptualizing the process of reading comprehension from the standpoint of the essential skills that readers must use to understand written language" (Francis, Kulesz & Benoit, 2018, p. 284). Evidence-based publications supporting school instruction include reviews and focus on word-reading and language skills, but no focus on word-writing and written expression and their impact on reading (Hempenstall, 2016; Stuart & Stainthorp, 2015). Additionally, with a focus on establishing literacy factors that are common, models are strengthened by including factors impacting reading and writing development.

This paper proposes the Literacy Component Model (LCM, see Figure 1), as a flexible, pragmatic, universal model of reading, writing, literacy skills and development. It is built from the SVR and the knowledgebase on factors impacting literacy development.

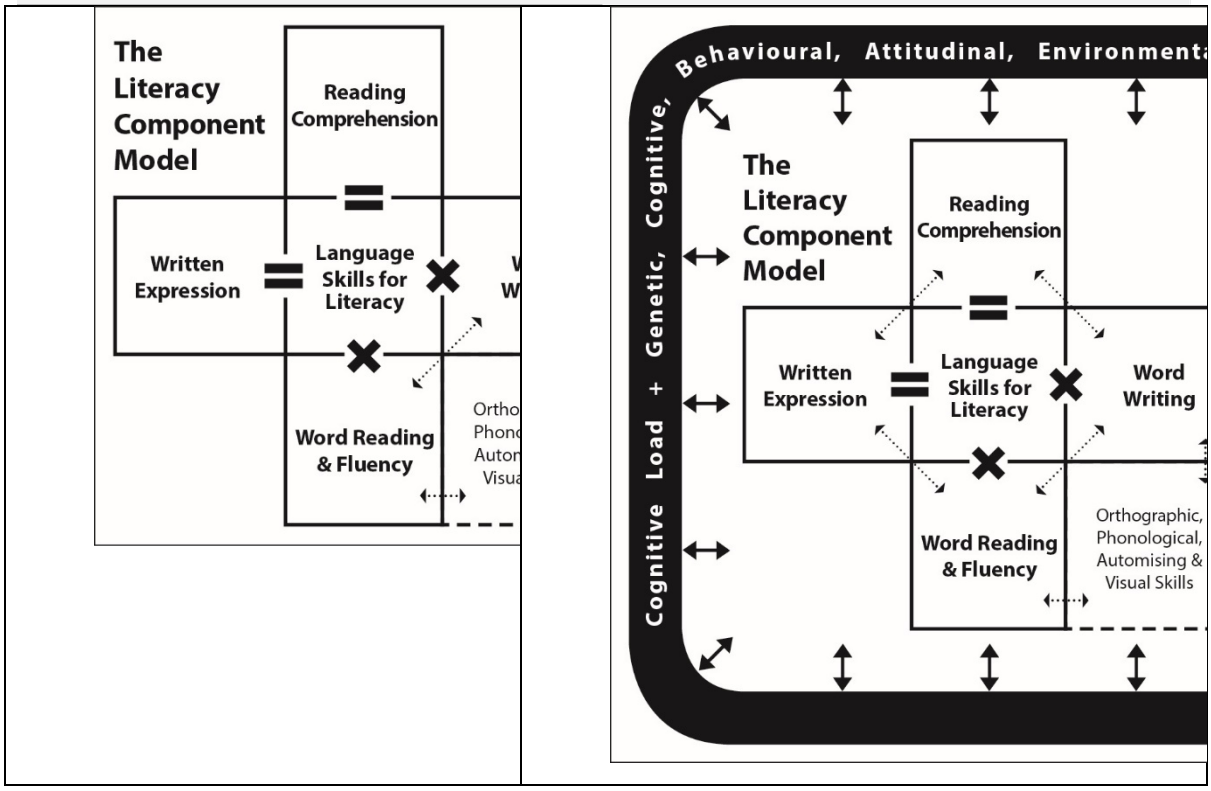

Figure 1. The Literacy Component Model in simple and expanded forms (Knight, Galletly & Gargett, 2017a; 2017b)

As shown in Figure 1, the LCM includes writing with reading and prioritises the teaching and the development of five key literacy components including reading comprehension, word-reading, language skills for literacy, word-writing, and written expression. The model also adds phonological, orthographic, visual and automatising skills as key contributing subskills that impact word-reading and word-writing development.

The Figure 1 expanded form includes arrows emphasising the interrelationships of components and additional key factors that impact learning, namely the cognitive load of learning and literacy tasks, and genetic, cognitive, behavioural, attitudinal, environmental, instructional and child impacting factors. As noted by Tunmer & Hoover in their explanation of the Cognitive Foundations Framework (2019, p. 80), "word recognition and language comprehension skills are themselves each dependent on the development of several other cognitive elements", which can also have distal effects on success expectancy, on task behaviour and learned helplessness.

In its positioning of the five literacy components, the LCM emphasises the central role of language skills in reading and writing as well as the parallels of word-reading and word-writing. The similarities include both being code-breaking 'accuracy' skills that utilise phonological, orthographic, visual and automatising skills; as well as combining with language skills to create reading comprehension and written expression. Like the SVR, the LCM can be displayed as quadrants of achievers (See Figure 2).

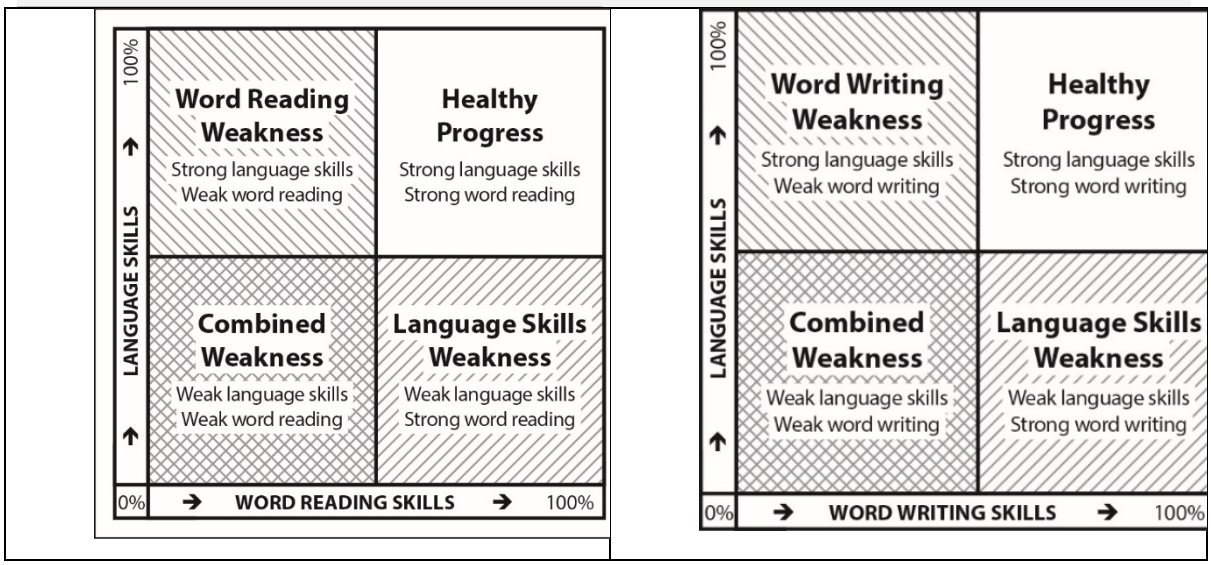

Figure 2. Quadrants of literacy achievement, for reading comprehension (left) and written expression (right).

The LCM promotes reflection on both the separateness and distinctiveness of components, as well as their interrelationships. Like the SVR, it separates highly complex constructs to cleaner categorical terms. Much of the LCM is not conceptually new, for example a 'Simple View of Writing' is used elsewhere (Juel, 1988; Juel et al., 1986; Nicholson & Dymock, 2015), as are the terms 'Literacy' (grouping word-reading, word-writing, reading comprehension and written expression; Juel et al., 1986), and the addition of psychological (learned helplessness) and ecological cognitive components of the 'Component Model' (Aaron, Joshi, Regina, & Kwesi, 2008; Mellard, Woods, & McJunkin, 2015). However, there is value in strategically placing important literacy components together in a pragmatic useful form. As such, the LCM is intended as a practical and purposeful stating of key literacy components and their linkages for use in research and instruction.

This paper has 3 sections. The first section discusses research showing the logic of the LCM's choice of components, subskills and impacting factors. A second section provides a rationale for the model, while the final section outlines how the model can be applied and used in classrooms.

RESEARCH SUPPORTING LCM CONCEPTS

The LCM builds from the advantages and research base of the SVR (Bonifacci & Tobia, 2017; Catts et al., 2015; Hempenstall, 2016; Kim, 2017; Stuart & Stainthorp, 2015; Torppa et al., 2016). With the LCM also including writing and orthographic, phonological, automatising and visual skills, a review of studies on these areas is useful towards establishing the validity of the LCM.

Reading-writing relationships

Studies report oral language skills and written expression to be relatively independent but interacting competences (Eklund, Torppa, Aro, Leppänen, & Lyytinen, 2015; Hebert, Gillespie, & Graham, 2013; Hulme, Nash, Gooch, Lervåg, & Snowling, 2015; Rueda-Sánchez & López-Bastida, 2016; Serry et al., 2015). Linkage of language skills to both reading and writing logically underlies Hebert and Graham's (2013) meta-analysis' finding that building written-expression skills improves reading-comprehension skills. A meta-analysis of 31 studies of morphological awareness training showed strong effects on both written expression and reading comprehension (Rueda-Sánchez & López-Bastida, 2016). Serry et al. (2015) reported spelling and word-reading correlated strongly with each other, but far less to language skills.

Strong reading-writing relationships are established in diverse research areas including school achievement data, brain imaging studies, lexicon research, literacy instruction, and crosslinguistic research. Together with studies showing the independence of language and written-expression skills, this research supports LCM's *Written Expression = Word Writing x Language Skills.*

School and regional achievement data shows the linkage of reading and writing at similar levels (Australian Curriculum Assessment and Reporting Authority (ACARA), 2016; Pressley, Mohan, Raphael, & Fingeret, 2007). Research reported similar results, with for example Montague et al.'s (2013) investigation of writing of children with high and low reading-comprehension skills to be reading and writing at similar levels.

Brain-imaging studies report strong reading-writing interrelatedness (Boros et al., 2016; Eckert et al., 2003). The Visual Word Form Area is central to word-reading, word-writing, and orthographic processing; whilst being under-activated in dyslexic readers and writers. Eckert and Berninger (2003) reported neuroanatomical measurements correlated similarly with reading and writing. DeMarco and colleagues' (2017) brain-imaging study of spelling found results generally consistent with word-reading studies, with both engaging a network associated with reading, spelling and phonological processing skills. Rapcsak et al.'s (2009) study of adults with brain damage to regions implicated in phonological processing showed they had both dyslexia and dysgraphia, and qualitatively similar levels of weakness.

Studies exploring whether reading and writing use individual or shared lexicons show strong reading-writing connections, with different studies suggesting lexicons are separate (Burt & Tate 2002), or separate-but-shared (Jones & Rawson 2016; Rapcsak et al., 2009). With school literacy instruction regularly using integrated reading-writing instruction, educators likely view reading and writing as overlapping interacting factors in keeping with shared and separate-but-shared lexicon accounts.

Research on instructional impact, self-teaching and invented spelling have established strong reading-writing parallels. Graham and Harris' (2003) meta-analysis of studies of Self Regulated Strategy Development (SRSD) used for writing reported results similar to SRSD reading studies. Graham & Santangelo's (2014) meta-analysis of spelling-instruction impacts reported spelling instruction significantly correlated with phonological-awareness and word-reading improvement. Shahar-Yames and Share's (2008) self-teaching study reported spelling and word-reading similarly use self-teaching. Beginning readers' invented-spelling skills expedite both reading and spelling development across nations and orthographies (Ding, Liu, McBride, & Zhang, 2015; Ouellette & Sénéchal, 2017). Invented-spelling tasks also identify weak readers (Ding et al., 2015).

Handwriting research reports value in the LCM including handwriting in word writing (Limpo, Alves, & Connelly, 2017; Nicholson & Dymock, 2015). Nicholson and Fawcett (2011) discuss the term dysgraphia used for both spelling and handwriting difficulties, given many weak readers have handwriting difficulties. The cognitive-load impact of spelling and handwriting last many years, for example, handwriting fluency and spelling accuracy correlate significantly with secondary students' written expression (Limpo et al., 2017).

Research on causal factors for dyslexia and dysgraphia also explore reading-writing connections, with a general consensus that multiple causes are present. Zoccolotti and Friedmann (2010) reviewing dyslexia and dysgraphia research, suggest no single cause will explain them, with the likelihood of multiple dyslexias and dysgraphias.

Finally, focussed research has vigorously explored reading-writing connections (Berninger, Abbott, Abbott, Graham, & Richards, 2002; Berninger et al., 2010; Eckert et al., 2003; Graham & Harris, 2003; Graham & Santangelo, 2014; Hebert et al., 2013; Hebert & Graham, 2011; Juel, 1988; Juel et al., 1986). Juel's early studies, conducted with SVR developer Gough (Juel, 1988; Juel et al., 1986), used the SVR and a Simple View of Writing model. Conclusions stated that word-reading and spelling are strongly related; that reading comprehension and written expression are significantly but less strongly related (with the likelihood that the measures used lessened the strength of relationship), that early reading weakness strongly predicts later reading weakness (a probability of 0.88), that early writing weakness predicts later writing weakness, though less strongly; and that weak readers tend to become weak writers. Berninger, et al (2002) report that reading and writing systems draw on common and unique processes, with strong reading-writing links at both word level (word reading and spelling) and text level (reading comprehension and written expression).

Cognitive Load and Orthographic, Phonological, Automatising & Visual Skills

There is considerable research establishing the cognitive load experienced in literacy learning tasks as a key factor impacting reading and writing development, particularly when the role of working memory in managing cognitive load is considered (Nevo & Breznitz, 2013; Swanson,

Zheng, & Jerman, 2009; Wang & Gathercole, 2013). Brain-imaging studies report spelling as having a higher cognitive load than word reading (DeMarco, Wilson, Rising, Rapcsak, & Beeson, 2017). Limpo et al.'s (2017) study reports that the cognitive load of handwriting and spelling continues across the years, even contributing significantly to secondary school students' written expression.

Phonological and orthographic skills are intricately related to each other through the alphabetic principle. Word reading and word writing use phonemes and graphemes, with phonological and orthographic skills used to transfer between them. Both phonological awareness and orthographic skills (e.g., letter-sound knowledge) are established as predictors of the effectiveness of word-reading and spelling development; with students with word-reading and spelling difficulties showing phonological and orthographic weakness (Landerl et al., 2013; Ouellette & Sénéchal, 2017; Warmington & Hulme, 2012).

Considerable research establishes linkages of phonological awareness and orthographic skills with reading (Stuart & Stainthorp, 2015; Hempenstall, 2016), and increasingly their relationship with writing. For example, Berninger, et al (2002) studies of children with literacy weakness reported orthographic and phonological skills directly impacting word-reading spelling and written expression, orthographic skills directly impacting reading rate and handwriting, and phonological skills directly impacting reading comprehension. Graham and Santangelo's (2014) meta-analysis reports spelling instruction significantly related to improved phonological awareness.

Crosslinguistic studies show the worth of the LCM including orthographic and phonological skills. Nations vary greatly on orthographic characteristics and complexity, and these features impact reading and writing (Frost, 2012; Knight, Galletly & Gargett, 2019; Rueckl et al., 2015; Schmalz, Marinus, Coltheart, & Castles, 2015). English word-reading and phonemic-awareness development is much slower than in the reading of regular orthographies (Landerl et al., 2013; Seymour, Aro, & Erskine, 2003; Ziegler et al., 2010). Orthographic skills for Anglophone readers seem to time-limit phonemic-awareness development delaying it until children learn letters and word reading (Goswami, 2002).

Many studies reveal the visual processing of different orthographies significantly impacts literacy development. These include visual-verbal paired associate learning (Stainthorp, Stuart, Powell, Quinlan, & Garwood, 2010; Warmington & Hulme, 2012), and eye fixations, visual attention, letter-identity span and word-length effect (Häikiö, Bertram, Hyönä, & Niemi, 2009; Rau, Moll, Snowling, & Landerl, 2015; van den Boer, de Jong, & Haentjens-van Meeteren, 2013). Häikiö et al. (2009) reported letter-identity span (number of letters identified in single eye fixations) similar for Finnish and English readers, with stronger readers having larger letter-identity span. Rau et al.'s (2015) eye-movement study of German and English readers observed similar total word-processing time, but different small-unit processing as German children used small-unit processing early in word recognition while English children used it

only when rereading. Van den Boer et al. (2013) reported the Word Length Effect (longer latencies for longer words) involves visual, orthographic, and phonological processing.

Considerable research establishes the importance of automisation skills in supporting children to master and automise word reading and writing. Whilst phonological deficits play a major role in word-reading and word-writing weakness, cumulative data suggests that automatising factors beyond phonological processing and a procedural learning deficit are also evident (Gabay, Thiessen, & Holt, 2015; Nicolson & Fawcett, 2011).

Studies relate that multiple factors underlie automisation difficulties and learning proficiency. These include efficiency of short-term memory, working memory, executive functioning, Rapid Automised Naming (RAN), processing speed, naming speed, articulation speed, articulation time and pause time when speaking, and speech-discrimination speed (Berninger et al., 2010; Brandenburg et al., 2015; Landerl et al., 2013; Limpo et al., 2017; Moll et al., 2014; Nevo & Breznitz, 2013; Stainthorp et al., 2010; Swanson et al., 2009; Wang & Gathercole, 2013; Warmington & Hulme, 2012).

There has been robust research on the role played by short-term and working memory and executive functioning in literacy skills and development (Brandenburg et al., 2015; Gooch, Thompson, Nash, Snowling et al., 2016; Nevo & Breznitz, 2013; Swanson et al., 2009; Wang & Gathercole, 2013). As an example, Berninger et al (2010) reported working memory contributed unique variance to handwriting, spelling, composing, word reading, and reading comprehension of Year 2 and 4 children, and to spelling, word reading, and reading comprehension in Year 6 children.

Considerable research shows RAN strongly related to fluency, automisation and literacy difficulties (Hintikka et al., 2008; Landerl et al., 2013; Li et al., 2009; Limpo et al., 2017; Moll et al., 2014; Savage et al., 2008; Stainthorp et al., 2010; Warmington & Hulme, 2012). Early childhood predictors of RAN, phonological awareness, and letter-sound knowledge assume Anglophone children to be at-risk of word-reading and word-writing weakness, while regular-orthography readers are at-risk of spelling and fluency weakness (Eklund et al., 2015; Landerl, 2000; Landerl et al., 2013; Moll et al., 2014; Rau et al., 2015; Warmington & Hulme, 2012). Warmington and Hulme (2012) established visual processing (visual-verbal paired-associate learning), RAN, and phonological awareness as highly independent processes each predicting different reading aspects. RAN weakness links to phonological awareness weakness, orthographic weakness, reading delay in children with healthy phonological awareness, low processing speed, visual processing including discriminating simple visual features, and poor response-to-intervention (Savage et al., 2008; Stuart & Stainthorp, 2015; Warmington & Hulme, 2012).

In the LCM, automisation skills can be used as a catch-all category for other factors beyond cognitive processing which are likely to impact mastery and automisation of word-reading and

word-writing. This catch-all role is supported by SVR studies showing much unexplained variance after key factors are considered. It is likely other factors less frequently highlighted are also involved. These include the cognitive load of the required learning, prior learning, learning rate, spoken-language features, monolingualism and multilingualism, age when commencing word-reading instruction, attention, motivation, and, using Maier and Seligman's (2016) revised Learned Helplessness theory, Learned Helplessness and resilience developed in early literacy development.

RATIONALE FOR THE LCM

Whilst very much reflecting current knowledge, the LCM is a model that demonstrates its alignment with current theories and research knowledge. Catts and Hogan (2003, p.239) emphasise:

> *"If we have learned anything about reading in recent years, it is that it is far more complex than anyone thought. In fact, reading may be the most complex cognitive activity that we humans learn. Therefore, we will likely need complex models and intervention programs. However, models need to rest on a solid foundation. We feel that the Simple View of Reading and its linguistic underpinnings provide a start to such a foundation".*

The SVR is indeed an invaluable foundation. The LCM builds from that basis, being similarly offered as a research-based foundation, enabling consideration of cognitive subcomponents, complex research inquiries, instructional complexities, and universal and restricted aspects of literacy development.

The LCM's benefits

Whilst literacy research and instruction have many aims and purposes, two aims seem dominant. One is building understanding of literacy instruction that improves children's literacy development. The second, necessary for the first to be achieved, is building a detailed understanding of reading and writing development. The LCM offers a framework to optimise instruction to fully comprehend literacy development.

Firstly, by including writing with reading, there is an emphasis on the collaboration of the skills. In school and life, reading and writing almost invariably accompany each other as highly interactive, mutually supportive skills. This suggests the need for models to include writing and reading.

Secondly, the LCM emphasises that reading comprehension is not to be something subsumed within language instruction but should be treated as an instructional target. The LCM is pragmatically useful to highlight the components which represent the instructional foci. The authors acquired an understanding of the strong intuitive appeal of the LCM when working

with Australian teachers in a collaborative research project on what constitutes optimal reading instruction for at-risk readers (Knight, et al., 2017b). Indeed, the LCM was one of the most popular aspects of the project, with teachers liking the central role of language skills; the parallels between reading and writing; instructional emphases on the three partner skills of reading comprehension, word reading and language skills for literacy; and the logical subgroups created using the LCM and SVR quadrants. Whilst not part of the research project, many schools have included the LCM in their schools' literacy curricula.

A third issue, sometimes contentious, is the inclusion of reading fluency in addition to word reading (Silverman et al., 2013). Logically, whilst all LCM components have a fluency component when skills building increases automisation, the LCM lists fluency only with word reading ('Word Reading & Fluency') for the following reasons. Firstly, reading fluency is an instructional focus, that many educators do not simply consider a part of word reading. Secondly, reading fluency has a strong crosslinguistic research focus, with failure to achieve proficient word-reading fluency conceivably being a universal feature of reading disability. As word-reading accuracy development occurs readily in regular-orthography nations, most dysfluent readers have Rapid Automised Naming (RAN) weakness, with multiple studies in regular-orthography nations reporting a lack of long-term effectiveness of fluency interventions (Hintikka et al., 2008).

A fourth benefit is the comparison of variable weakness in word reading and language skills (Figure 2a). Rather than restricting comparison to a single pair of variables (such as in the SVR and the Double Deficit models), the LCM considers that double deficits can logically occur across many variable pairs. The LCM enables sole-dual comparison of many variables as for example, Brandenburg et al (2015) used word-reading and spelling in sole-dual comparisons of German children (isolated word-reading weakness, isolated spelling weakness, and combined reading-spelling weakness). Other variable pairs which might be explored using sole-dual comparisons include word-reading and executive-function skills, word-reading and written-expression, word reading and numeracy, written expression and reading comprehension, working-memory and short-term memory, handwriting accuracy and speed, spelling and phonemic-approximation writing, executive-function and reading comprehension. The LCM enables this exploration across diverse variables.

The interrelationships of literacy subskills are another sphere of LCM strength. The LCM encourages considering interactions instead of only emphasising disassociations (Kim, 2017; Protopapas et al., 2013). For example, vocabulary and language comprehension of texts scaffold word-reading of unfamiliar words; language skills underlie word reading skills (early language skills predict and underlie phoneme awareness and letter-sound knowledge, and in turn word-reading); phonological and orthographic skills build vocabulary (through factors such as careful pronouncing of words, reflecting on sounds and syllables, and seeing words' written form); and connectionist and other models show reading, writing and language skills

and subskills actively interacting with each other's development in subtle but definite ways (Hulme et al., 2015; Kim, 2017; Kim, Otaiba, Puranik, Folsom, & Greulich, 2013).

Finally, there is a need for potentially universal models to include consideration of how reading and writing factors differ across nations due to orthographic and linguistic variances. These factors incorporate orthographic characteristics; spoken-language characteristics, for example the extent of morphemic information in words; methods of instruction; and differences in the extent of involvement of phonological, and cognitive impacting factors in reading and writing. The LCM enables multifaceted consideration of crosslinguistic and cross-national differences. Considerable research establishes SVR universality, however, from a practical viewpoint, this is less so given regular-orthography readers rapidly master proficient word-reading accuracy, with fluency differences strongest in earliest reading (Bonifacci & Tobia, 2017; Moll et al., 2014; Seymour et al., 2003; Tobia & Bonifacci, 2015; Ziegler et al., 2010). By including writing and processing skills, the LCM has robust usefulness as a universal model.

A Flexible Model

The LCM considers language, reading, and writing skills, subskills and impacting factors as in some respects discrete, whilst in other ways interrelated, thus inviting exploration and illumination of those relationships. Somewhat akin to Grigorenko and Dozier (2013, p.11) discussing the increasingly well-researched human genome as being "both structurally malleable and functionally dynamic," we propose the LCM as being a malleable model, not always restricted to its Figure 1 form and equations.

The LCM has potential to take on varied forms in different contexts such as different stages of literacy development, individual differences, and variations in diverse orthographies. In proposing flexibility, we suggest some users might add factors such as processing speed, cognitive processing and vocabulary as additional components. Joshi and Aaron (2003) reported processing speed added significant additional variance, suggesting a relationship of Reading Comprehension = Word-Reading x Language Skills + Processing Speed. Mellard and colleagues (2015), in their work with adult-education participants, established both working memory and processing-speed added significant additional variance, such that Reading Comprehension = Word-Reading x Language Skills + Cognitive-Processing Efficiency.

Other educators might prefer vocabulary as positioning separately to language skills, so both areas are prioritised instructional foci. As such, Reading Comprehension = Word-Reading x (Language Skills + Vocabulary). This is supported by findings that vocabulary, language skills, and word-reading skills each have similarly strong relationships with reading comprehension (Protopapas et al., 2013).

Students using highly regular orthographies rapidly develop proficient word-reading, spelling and phonemic-awareness skills, and thus have access to independent reading and written

expression earlier (Ziegler et al., 2010). Speed of acquisition might become an additional component in studies comparing Anglophone and regular-orthography literacy development. This suggests that Reading Comprehension = Word-Reading (Skill level + Rate of development) x Language Skills (Skill level + Rate of development) x Automatising Skills. This equation might also be used in studies of multilingual students (Bonifacci & Tobia, 2017) and those with inherited literacy disability (Eklund et al., 2015; Hulme et al., 2015).

Spoken language factors that vary across nations also create differing strengths of LCM relationships (Li et al., 2009; McBride-Chang et al., 2005; Ziegler et al., 2010). Morphemic awareness might be an additional factor for Chinese and Finnish children, given many Chinese words are compound words and long Finnish words are morphemically dense. As such the equation becomes Reading Comprehension = Word-Reading x Morphemic Awareness x Language Skills. Studies find morphological awareness and vocabulary more strongly impact Chinese (Li et al., 2009; McBride-Chang et al., 2005), and word-reading development (Ziegler et al., 2010).

Japanese uses less than 120 syllables, creating the likelihood of vocabulary errors if not attending to words' syllables. For example, kirei (pretty)/kirai (I hate it), kurage (jellyfish)/karage (fried chicken); and Japan's initial orthography, Hiragana, has one grapheme for each syllable (Knight, et al., 2017a). Syllable awareness might thus impact vocabulary and word reading development, such that Reading Comprehension = Word-Reading x Syllabic Awareness x Language Skills (Vocabulary + Language Comprehension).

When orthographic factors are being explored, several expansion options are available. Orthographic impacting factors can be added to the LCM's list of impacting factors (See Figure 1b), to include orthographic and linguistic factors, or, for research focused on word reading and spelling, Orthographic Skills might be expanded and used to include orthographic complexity aspects. For example, Reading Comprehension = Word-Reading (Orthographic Learning + Orthographic-Complexity impacts) x Language Skills.

Visual Processing might also at times be an additional factor, as the relationship of visual processing to word-reading and word-writing is also likely to differ across nations. Many Chinese, Taiwanese and Japanese graphemes and Kanji are visually similar, thus students attend to their visual distinctiveness, with studies finding stronger visual-verbal paired associate learning (Li et al., 2009). That equation might be Reading Comprehension = Word-Reading (Visual Processing + Orthographic Learning + Orthographic-Feature impacts) x Language Skills.

There are many and diverse theories and models of reading, writing and literacy development, at a range of behavioural, cognitive, neural systems, brain area and genetic levels (Frost, 2012; Grigorenko & Dozier, 2013; Stuart & Stainthorp, 2015). Using the LCM's flexibility, multiple components, processing skills and impacting factors, the LCM is compatible with, and supports

discussion of diverse models of literacy and learning (Frost, 2012; Gabay et al., 2015; Goswami, 2002; Konold et al., 2003; Nicolson & Fawcett, 2011; Seymour et al., 2003; Shahar-Yames & Share, 2008).

USING THE LITERACY COMPONENT MODEL

The preceding sections of this paper have established the evidence base for the Literacy Component Model, its organisation, and its component parts. However, the ultimate value of any theoretical model lies in how it can be used or applied; that is, its transferability to practical contexts. In the case of the LCM, three key features contribute to its universality, relevance, and accessibility to practitioners as a model for designing and implementing rich, effective and targeted literacy instruction for learners across the full range of abilities in contemporary class settings. These features are: (1) the centrality of the "language skills for literacy" component as an organising feature of the LCM; (2) the collocation of reading and writing as interrelated and reciprocal processes; and (3) the distinctive and separate components of the LCM as a guide for explicit and focused instruction and pedagogical decision-making. These features will now be clarified as a guide to the practical application of the LCM.

Organisation of the LCM: The centrality of "language skills for literacy"

The component "language skills for literacy" is positioned as a central, integrating feature of the LCM. This positioning emphasises the synergistic nature of the LCM's component parts by connecting the cognitive processes of reading and writing to socially and culturally meaningful uses of language. In this way, the LCM situates print-based instruction within a framework of dynamic and purposeful "literacy practice" (Purcell-Gates, Jacobsen & Degener, 2004, p. 26). Through this central focus on learning language for authentic social purposes, the LCM illustrates the complementarity, rather than the distinctiveness of cognitive and socio-cultural theories of literacy development. Important ideas from both theories are incorporated into the LCM which anchors the direct and explicit instruction of language skills for accessing and using print (Snow, Burns & Griffin, 1998) within social settings and literacy events where the processes of reading and writing occur (Tracey & Morrow, 2006).

The expanded form of the LCM highlights the milieu surrounding practical application of the LCM, particularly with respect to its pivotal focus on learning "language skills for literacy". Consideration of these social, cultural, environmental, and contextual factors and their impact on literacy learning events contributes to claims that the LCM presents a universal approach to reading and writing instruction. Specifically, by highlighting the acquisition of language knowledge for literate behaviour as a central organising feature of its design, the LCM encompasses a structure for facilitating instruction in different settings, with different readers and writers, at different stages of their literacy learning. These applications extend beyond print-based instruction in the early years of schooling or compensatory approaches to instruction for learners judged to be 'lacking' in some aspect of their print literacy development

to encompass language learning that occurs across the school curriculum, outside of school settings and across the life span (Purcell-Gates et al, 2004). For example, a high school Science teacher applies the central organising idea of the model to instruction that facilitates comprehension and composition of scientific texts with the same focus on meaning-making practices and authentic language learning that informs word-reading and word-writing instruction for beginning readers and writers.

It is also evident from its focus on learning language for meaningful purposes that the LCM concentrates instructional attention on the language of texts as the source of literacy knowledge and instruction rather than discrete, decontextualised skills. From this perspective, the LCM encompasses an "ecological" (Barton, 2007, p. 32) approach to reading and writing instruction. This approach, embedded in the design of contemporary curriculum frameworks such as the Australian Curriculum (Australian Curriculum Assessment and Reporting Authority, [ACARA], 2019), suggests that texts provide the context for "learning language, learning through language, [and] learning about language" (Halliday, 2004, p. 350). This triad of instructional purposes necessitates that putting the Literacy Component Model into practice creates opportunities for explanatory and exploratory talk around language use and literacy that invite learners to activate their background knowledge and cultural understandings as they make sense of the texts they encounter. As such, the LCM guides practitioners towards the selection of texts that provide a context for acquiring and using the important subskills of print-based literacy or features of a genre while simultaneously emphasising 'doing' literacy so that learners develop understanding of how and when to use their reading and writing knowledge.

The interrelated cognitive processes of reading and writing

Reading and writing are depicted as interrelated processes in the LCM. The model connects reading to writing (and vice versa) through the overarching focus on learning language as a resource for participating in authentic literacy events involving print. As a result, the LCM maps the knowledge, skills and strategies that are both common to reading and writing processes and those that are distinct to each modality as a guide for planning targeted instruction for language users at different stages of literacy development. In identifying the relationship between these processes for acquiring and using literacy, the LCM addresses the cognitive demands of learning the code of written language while emphasising the social purposes of communicating meaning through reading and writing. Furthermore, in establishing the reciprocity of the subskills underpinning reading and writing, the LCM creates a practical basis for planning instruction where learning in reading constructs knowledge for encoding language in writing, and learning through writing supports the decoding of written language during reading.

The organisation of the LCM confirms the importance of systematic instruction in the skills of reading and writing as foundational knowledge for being (and becoming) print literate (Purcell-Gates & Tierney, 2009). Using the SVR (Gough & Tumner, 1986; Hoover & Gough, 1990)

and the simple view of writing (Juel, Griffith & Gough, 1986) as its basis for identifying the interrelated skills of word-reading and word-writing, the LCM emphasises instruction in the sub-skills necessary for accessing and using the code of written language. These skills are presented as essential knowledge resources that language users need to learn to be able to participate in reading and writing events. Their placement in the LCM establishes their significance for encoding and decoding written language at the word level and provide a basis for early reading and writing instruction as well as assessment of the learning needs of individual readers and writers who may benefit from focused instruction.

While the LCM explicates essential subskills for accessing the code of written language, reading and writing are represented as interrelated processes for the meaningful communication of ideas through print. This feature is evident in the components of written expression and reading comprehension that are illustrated in the LCM as the outcomes of instructional approaches that take account of both skill acquisition and the social contexts in which print literacy is performed. From this perspective, texts perform a central role in modelling language use for achieving these social purposes; that is, the texts used for reading become representations for writing or constructing texts. One obvious advantage of these components of the LCM is the extension of language knowledge beyond that provided by the sound system of language to the activation of semantic, syntactic and textual forms of knowledge. Consequently, the LCM allows for development of this knowledge at increasing levels of sophistication as students engage with the vocabulary, structure and language in a wider range of text types encountered in their schooling and everyday lives; further contributing to the LCM's universality as a framework for achieving rich literacy instruction.

Finally, the collocation of written expression and reading comprehension in the LCM assumes the participation of learners as active readers and writers in literacy learning events. Skills are learnt in context and are understood as resources for comprehending and expressing ideas through meaningful engagement with texts. These provisions create opportunities for deep learning as students read their own writing and that of their peers with a view to evaluating language use and achievement of a text's purpose. This feature of the LCM provides the basis for developing learners' metacognition or strategies for monitoring the process of making meaning through print (Afflerbach, 2007).

Distinctiveness of skills, processes and characteristics that impact literacy learning.

Despite the strengths inherent in a holistic view of the LCM, its strengths also lie in the separateness and distinctiveness of its components. Each component illuminates a skill, strategy, process or characteristic that must be considered in the design of effective evidence-based instruction. In its simple form, the LCM deliberately pares back the complexity associated with literacy instruction to highlight the essential knowledge, skills, and understandings for achieving successful reading and writing. The LCM, in its expanded form, details the social, cultural, environmental, and contextual considerations that impact on

pedagogical decisions about how this knowledge will be presented to, or learnt by, language users.

The simple form of the LCM clearly defines the subskills that must be acquired by language learners to access the code of written language. The explication of these skills provides a focus for evidence-based instruction for beginning readers and writers along with an effective framework for assessing and monitoring skill acquisition. Subsequently, the framework of subskills that underpins word reading and word writing directs practitioners towards the 'what' of instruction that will enhance the reading and writing success of learners with diverse backgrounds and learning needs.

By contrast, the expanded form of the LCM focuses attention on pedagogical decision-making; that is, the 'how' and 'why' of instructional methods that are responsive to the learning needs of individual language users. The LCM acknowledges that literacy learning is influenced by a wide range of factors that must be considered when designing instruction for maximum learning (Lee, Spencer & Harpalani, 2003). These factors require practitioners to know their learners and their learning needs and to be prepared to adjust instructional methods in ways that make reading and writing knowledge and processes relevant, meaningful, and engaging for all students.

CONCLUSION

The LCM is a pragmatic potentially universal model with strong practical usefulness for researchers and educators. There is much to be learned about literacy and language development and effective literacy instruction, and the coming decades are likely to be an exciting time in research on this area. A flexible malleable LCM has potential to support diverse future learning.

The SVR simplifies relationships within reading, with simplicity valued when complexity abounds. However, there is also a need for complex and interactive models to frame an understanding of the complex interrelationships of literacy factors (Catts & Hogan, 2003; Gao, 2013). Additional value is created when a potentially universal model can be used on a pragmatic basis to influence practice.

The LCM is a flexible, pragmatic model created for educators and researchers to use for diverse purposes. These include researchers building knowledge on complex interrelationships and educators focussing on optimising literacy development and instruction.

ACKNOWLEDGMENT

This work was supported by the Australian Research Council under grant LP130100612.

REFERENCES

Aaron, P., Joshi, R., Regina, G., & Kwesi, E. (2008). *Diagnosis and treatment of reading disabilities based on the component model of reading: An alternative to the discrepancy model of LD.* Journal of Learning Disabilities, 41(1), 67-84.

Afflerbach, P. (2007). *Understanding and using reading assessment, K – 12*. Newark, DE: International Reading Association.

Australian Curriculum Assessment and Reporting Authority (ACARA). (2016). *National Assessment Program Literacy and Numeracy (NAPLAN): Achievement in reading, writing, language conventions and numeracy: National report for 2016*. Retrieved from http://www.nap.edu.au/verve/_resources/2015_NAPLAN_national_report.pdf

Australian Curriculum Assessment and Reporting Authority [ACARA]. (2019). *F – 10 Curriculum English: Understanding how English works.* Retrieved from https://www.australiancurriculum.edu.au

Barton, D. (2007). *Literacy: An introduction to the ecology of written language.* Oxford: Blackwell Publishing.

Berninger, V., Abbott, R., Abbott, S., Graham, S., & Richards, T. (2002). Writing and reading: Connections between language by hand and language by eye. *Journal of Learning Disabilities, 35*(1), 39-56.

Berninger, V., Abbott, R., Swanson, H., Lovitt, D., Trivedi, P., Lin, S.-J., . . . Amtmann, D. (2010). Relationship of word- and sentence-level working memory to reading and writing in Second, Fourth, and Sixth Grade. *Language, Speech, & Hearing Services in Schools, 41*, 179-193.

Bonifacci, P., & Tobia, V. (2017). The Simple View of Reading in bilingual language-minority children acquiring a highly transparent second language. *Scientific Studies of Reading, 21*(2), 109-119.

Boros, M., Anton, J-L., Pech-Georgel, C., Grainger, J., Szwed, M., & Ziegler, J. C. (2016). Orthographic processing deficits in developmental dyslexia: Beyond the ventral visual stream. *NeuroImage, 128*, 316-327.

Brandenburg, J., Klesczewski, J., Fischbach, A., Schuchardt, K., Büttner, G., & Hasselhorn, M. (2015). Working memory in children with learning disabilities in reading versus spelling: Searching for overlapping and specific cognitive factors. *Journal of Learning Disabilities, 48*(6), 622-634.

Burt, J. S., & Tate, H. (2002). Does a reading lexicon provide orthographic representations for spelling? *Journal of Memory and Language, 46*(3), 518-543.

Catts, H., Herrera, S., Nielsen, D., & Bridges, M. (2015). Early prediction of reading comprehension within the Simple View framework. *Reading and Writing, 28*(9), 1407-1425.

Catts, H., & Hogan, T. (2003). Language basis of reading disabilities and implications for early identification and remediation. *Reading Psychology, 24*, 223-246.

DeMarco, A., Wilson, S., Rising, K., Rapcsak, S., & Beeson, P. (2017). Neural substrates of sublexical processing for spelling. *Brain and Language, 164*, 118-128.

Ding, Y., Liu, R.-D., McBride, C., & Zhang, D. (2015). Pinyin invented spelling in Mandarin Chinese-speaking children with and without reading difficulties. *Journal of Learning Disabilities 48*(6), 635-645.

Eckert, M., Leonard, C., Richards, T., Aylward, E., Thomson, J., & Berninger, V. (2003). Anatomical correlates of dyslexia: Frontal and cerebellar findings. *Brain, 126*(2), 482-494.

Eklund, K., Torppa, M., Aro, M., Leppänen, P., & Lyytinen, H. (2015). Literacy skill development of children with familial risk for dyslexia through grades 2, 3, and 8. *Journal of Educational Psychology, 107*(1), 126-140.

Frost, R. (2012). Towards a universal model of reading. *Behavioral and Brain Sciences, 35*(5), 263-279.

Gabay, Y., Thiessen, E., & Holt, L. (2015). Impaired statistical learning in developmental dyslexia. *Journal of Speech, Language, and Hearing Research, 58*(3), 934-945.

Gooch, D., Thompson, P., Nash, H., Snowling, M., & Hulme, C. (2016). The development of executive function and language skills in the early school years. *Journal of Child Psychology & Psychiatry, 57*(2), 180-187.

Goswami, U. (2002). Phonology, reading development, and dyslexia: A cross-linguistic perspective. *Annals of Dyslexia, 52*, 141-163.

Gough, P., & Tunmer, W. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7*(1), 6-10.

Graham, S., & Harris, K. (2003). Students with learning disabilities and the process of writing: A meta-analysis of SRSD studies. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of Learning Disabilities* (pp. 323-344). New York: The Guilford Press.

Graham, S., & Santangelo, T. (2014). Does spelling instruction make students better spellers, readers, and writers? A meta-analytic review. *Reading and Writing, 27*(9), 1703-1743.

Grigorenko, E., & Dozier, M. (2013). Introduction to the special section on genomics. *Child Development, 84*(1), 6-16.

Häikiö, T., Bertram, R., Hyönä, J., & Niemi, P. (2009). Development of the letter identity span in reading: Evidence from the eye movement moving window paradigm. *Journal of Experimental Child Psychology, 102*(2), 167-181.

Halliday, M. (2004). *The language of early childhood.* London: Continuum.

Hebert, M., Gillespie, A., & Graham, S. (2013). Comparing effects of different writing activities on reading comprehension: A meta-analysis. *Reading and Writing, 26*(1), 111-138.

Hebert, M., & Graham, S. (2011). Writing to read: A meta-analysis of the impact of writing and writing instruction on reading. *Harvard Educational Review, 81*(4), 710-744.

Hempenstall, K. (2016). *Read about it: Scientific evidence for effective teaching of reading*. Retrieved from https://www.cis.org.au/publications/research-reports/read-about-it-scientific-evidence-for-effective-teaching-of-reading:

Hintikka, S., Landerl, K., Aro, M., & Lyytinen, H. (2008). Training reading fluency: Is it important to practice reading aloud and is generalization possible? *Annals of Dyslexia, 58*(1), 59-79.

Hogan, T., Adlof, S., & Alonzo, C. (2014). On the importance of listening comprehension. *International Journal of Speech-Language Pathology, 16*(3), 199-207.

Hoover, W. & Gough, P. (1990). The Simple View of Reading. *Reading and Writing, 23*(2), 127-160.

Hulme, C., Nash, H., Gooch, D., Lervåg, A., & Snowling, M. J. (2015). The foundations of literacy development in children at familial risk of dyslexia. *Psychological Science, 26*(12), 1877-1886.

Jones, A., & Rawson, K. (2016). Do reading and spelling share a lexicon? *Cognitive Psychology, 86*, 152-184.

Joshi, R., Ji, X. R., Breznitz, Z., Amiel, M., & Yulia, A. (2015). Validation of the Simple View of Reading in Hebrew—A Semitic Language. *Scientific Studies of Reading, 19*(3), 243-252.

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology, 80*, 437-447.

Juel, C., Griffith, P., & Gough, P. (1986). Acquisition of literacy: A longitudinal study of children in first and second grade. *Journal of Educational Psychology, 78*(4), 243-255.

Kim, Y. G. (2017). Why the Simple View of Reading is not simplistic: Unpacking component skills of reading using a direct and indirect effect model of reading (DIER). *Scientific Studies of Reading*, 1-24.

Kim, Y. S., Otaiba, S., Puranik, C., Folsom, J., & Greulich, L. (2013). The contributions of vocabulary and letter writing automaticity to word reading and spelling for kindergartners. *Reading and Writing*, *27*(2), 1-17.

Knight, B. A., Galletly, S., & Gargett, P. (2017a). Managing cognitive load as the key to literacy development: Research directions suggested by crosslinguistic research and research on Initial Teaching Alphabet. In R. Nata (Ed.), *Progress in Education* (Vol. 45, pp. 61-150). New York: Nova Science Publishers.

Knight, B. A., Galletly, S., & Gargett, P. (2017b). *Principles of reading instruction towards optimising reading instruction for at-risk readers in Prep to Year 3*: Central Queensland University.

Knight, B.A., Galletly, S. & Gargett, P. (2019). Orthographic Advantage Theory: National advantage and disadvantage arising from impacts of spelling complexity. *Asia Pacific Journal of Developmental Differences,* 6 (1), 5-29.

Konold, T., Juel, C., McKinnon, M., & Deffes, R. (2003). A multivariate model of early reading acquisition. *Applied Psycholinguistics, 24*(1), 89-112.

Landerl, K. (2000). Influences of orthographic consistency and reading instruction on the development of nonword reading skills. *European Journal of Psychology of Education, 15*, 239-257.

Landerl, K., Ramus, F., Moll, K., Lyytinen, H., Leppänen, P., Lohvansuu, K., . . . Schulte-Körne, G. (2013). Predictors of Developmental Dyslexia in European orthographies with varying complexity. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 54*(6), 686-694.

Landerl, K., & Wimmer, H. (2008). Development of word reading fluency and spelling in a consistent orthography: An 8-year follow-up. *Journal of Educational Psychology, 100*(1), 150-161.

Lee, C., Spencer, M., & Harpalani, V. (2003). "Every shut eye ain't sleep": Studying how people live culturally. *Educational Researcher, 32*(5), 6 – 13.

Li, H., Shu, H., McBride-Chang, C., Liu, H., & Xue, J. (2009). Paired associate learning in Chinese children with dyslexia. *Journal of Experimental Child Psychology, 103*(2), 135-151.

Limpo, T., Alves, R., & Connelly, V. (2017). Examining the transcription-writing link: Effects of handwriting fluency and spelling accuracy on writing performance via planning and translating in middle grades. *Learning and Individual Differences, 53*, 26-36.

Maier, S., & Seligman, M. (2016). Learned helplessness at fifty: Insights from neuroscience. *Psychological Review, 123*(4), 349-367.

McBride-Chang, C., Cho, J.-R., Liu, H., Wagner, R., Shu, H., Zhou, A., . . . Muse, A. (2005). Changing models across cultures: Associations of phonological awareness and morphological structure awareness with vocabulary and word recognition in second graders from Beijing, Hong Kong, Korea, and the United States. *Journal of Experimental Child Psychology, 92*(2), 140-160.

Mellard, D., Woods, K., & McJunkin, L. (2015). Literacy components model for at-risk young adults enrolled in career and technical education. *38*(3), 249-271.

Moll, K., Ramus, F., Bartling, J., Bruder, J., Kunze, S., Neuhoff, N., . . . Landerl, K. (2014). Cognitive mechanisms underlying reading and spelling development in five European orthographies. *Learning and Instruction, 29*, 65-77.

Nevo, E., & Breznitz, Z. (2013). The development of working memory from kindergarten to first grade in children with different decoding skills. *Journal of Experimental Child Psychology, 114*(2), 217-228.

Nicholson, T., & Dymock, S. (2015). *The New Zealand Dyslexia handbook*. Wellington, NZ: NZCER Press.

Nicolson, R. & Fawcett, A. (2011). Dyslexia, dysgraphia, procedural learning and the cerebellum. *Cortex, 47*(1), 117-127.

Ouellette, G., & Sénéchal, M. (2017). Invented spelling in kindergarten as a predictor of reading and spelling in grade 1: A new pathway to literacy, or just the same road, less known? *Developmental psychology, 53*(1), 77-88.

Pressley, M., Mohan, L., Raphael, L. M., & Fingeret, L. (2007). How does Bennett Woods Elementary School produce such high reading and writing achievement? *Journal of Educational Psychology, 99*(2), 221-240.

Protopapas, A., Mouzaki, A., Sideridis, G., Kotsolakou, A., & Simos, P. (2013). The role of vocabulary in the context of the Simple View of Reading. *Reading and Writing Quarterly, 29*(2), 168-202.

Purcell-Gates, V., Jacobson, E., & Degener, S. (2004). *Print literacy development: Uniting cognitive and social practice theories.* Cambridge, MA: Harvard University Press.

Purcell-Gates, V., & Tierney, R. (2009). *Public policy brief: Increasing literacy levels of Canadian students.* Vancouver, Canada: University of British Columbia.

Rapcsak, S., Beeson, P., Henry, M., Leyden, A., Kim, E., Rising, K., . . . Cho, H. (2009). Phonological dyslexia and dysgraphia: Cognitive mechanisms and neural substrates. *Cortex, 45*(5), 575-591.

Rau, A., Moll, K., Snowling, M., & Landerl, K. (2015). Effects of orthographic consistency on eye movement behavior: German and English children and adults process the same words differently. *Journal of Experimental Child Psychology, 130*, 92-105.

Rueckl, J., Paz-Alonso, P., Molfese, P., Kuo, W-J., Bick, A., Frost, S., . . . Frost, R. (2015). Universal brain signature of proficient reading: Evidence from four contrasting languages. *Proceedings of the National Academy of Sciences of the United States of America, 112*(50), 15510-15515.

Rueda-Sánchez, M., & López-Bastida, P. (2016). Effects of morphological awareness training on reading, writing and comprehension: Meta-analysis. *Anales de Psicología, 32*(1), 60-71.

Savage, R., Vanitha, P., & Santo, M. (2008). Rapid serial naming is a unique predictor of spelling in children. *Journal of Learning Disabilities, 41*(3), 235-250.

Schmalz, X., Marinus, E., Coltheart, M., & Castles, A. (2015). Getting to the bottom of orthographic depth. *Psychonomic Bulletin & Review, 22*, 1614-1629.

Serry, T., Castles, A., Mensah, F., Bavin, E., Eadie, P., Pezic, A., . . . Reilly, S. (2015). Developing a comprehensive model of risk and protective factors that can predict spelling at age seven: Findings from a community sample of Victorian children. *Australian Journal of Learning Difficulties, 20*(1), 83-102.

Seymour, P., Aro, M., & Erskine, J. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology, 94*(2), 143-174.

Shahar-Yames, D., & Share, D. (2008). Spelling as a self-teaching mechanism in orthographic learning. *Journal of Research in Reading, 31*(1), 22-39.

Silverman, R., Speece, D., Harring, J., & Ritchey, K. (2013). Fluency has a role in the Simple View of Reading. *Scientific Studies of Reading, 17*(2), 108-133.

Snow, C., Burns, M., & Griffin, P. (1998). *Preventing reading difficulties in young children.* Washington, DC: National Academy Press.

Snowling, M., Duff, F., Nash, H., & Hulme, C. (2016). Language profiles and literacy outcomes of children with resolving, emerging, or persisting language impairments. *Journal of Child Psychology and Psychiatry*, *57*(12), 1360-1369

Stainthorp, R., Stuart, M., Powell, D., Quinlan, P., & Garwood, H. (2010). Visual processing deficits in children with slow RAN performance. *Scientific Studies of Reading, 14*(3), 266-292.

Stuart, M., & Stainthorp, R. (2015). *Reading development and teaching* (Vol. 1). London: SAGE Publications Ltd.

Swanson, H. Zheng, X., & Jerman, O. (2009). Working memory, short-term memory, and reading disabilities: A selective meta-analysis of the literature. *Journal of Learning Disabilities, 42*(3), 260-287.

Tobia, V., & Bonifacci, P. (2015). The Simple View of Reading in a transparent orthography: The stronger role of oral comprehension. *Reading and Writing: An Interdisciplinary Journal, 28*(7), 939-957.

Torppa, M., Georgiou, G., Lerkkanen, M., Niemi, P., Poikkeus, A., & Nurmi, J. (2016). Examining the Simple View of Reading in a transparent orthography: A longitudinal study from Kindergarten to Grade 3. *Merrill-Palmer Quarterly, 62*(2), 179-206.

Tracey, D. & Morrow, L. (2006). *Lenses on reading.* New York: Guilford Press.

Tunmer, W. & Chapman, J. (2012). The Simple View of Reading redux: Vocabulary knowledge and the independent components hypothesis. *Journal of Learning Disabilities, 45*(5), 453-466.

Tunmer, W. & Hoover, W (2019). The cognitive foundations of learning to read: A framework for preventing and remediating reading difficulties. *Australian Journal of Learning Difficulties*, 24(1), 75-93.

van den Boer, M., de Jong, P., & Haentjens-van Meeteren, M. (2013). Modeling the length effect: Specifying the relation with visual and phonological correlates of reading. *Scientific Studies of Reading, 17*(4), 243-256.

Wang, S., & Gathercole, S. (2013). Working memory deficits in children with reading difficulties: Memory span and dual task coordination. *Journal of Experimental Child Psychology, 115*(1), 188-197.

Warmington, M., & Hulme, C. (2012). Phoneme awareness, visual-verbal paired-associate learning, and rapid automatized naming as predictors of individual differences in reading ability. *Scientific Studies of Reading, 16*(1), 45-62.

Ziegler, J., Bertrand, D., Tóth, D., Csépe, V., Reis, A., Faísca, L., . . . Blomert, L. (2010). Orthographic depth and its impact on universal predictors of reading: A cross-language investigation. *Psychological Science, 21*(4), 551-559.

Zoccolotti, P., & Friedmann, N. (2010). From dyslexia to dyslexias, from dysgraphia to dysgraphias, from a cause to causes: A look at current research on developmental dyslexia and dysgraphia. *Cortex, 46*, 1211-1215.