No Pre-service Teacher Left Behind: The development and refinement of an online supplementary program designed to lift pre-service teachers' understanding of the science of word-level reading instruction.

Kelly R. Neumann

Supervisors:

Dr Karyn Carson (Principal Supervisor)

Dr Jane Jarvis (Co-Supervisor)

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Abstract

Purpose: Children who do not have a firm grasp on foundational skills that underpin early reading success are at high risk of experiencing reading difficulties without targeted intervention (Carson, Gillon & Boustead, 2013). In Australia, approximately one in five children struggle with reading development (Organisation for Economic Co-Operation and Development [OECD], 2004; United Nations International Children's Emergency Fund [UNICEF], 2017). Contradicting approaches regarding the best methods for teaching young children how to become skilful readers has been debated for many years and is coined '*The Reading Wars'* (Castles, Rastle & Nation, 2018). However, there is no need for such a war given that the scientific evidence regarding how to best teach young children how to read has been clear for at least 20-years (Ehri et al, 2001; Rose, 2006; Rowe & National Inquiry into the Teaching of Literacy [NITL] [Australia], 2005; Snow, Burns & Griffin, 1998). Repeatedly, the skills of phoneme awareness, phonics, reading fluency, vocabulary and comprehension strategies have been shown to be the key pillars of reading success (Hempenstall, 2016). Rather than arguing over the best way to teach children how to read, attention should be directed at how our education system and teachers can best be supported to ensure the key pillars of reading success are taught effectively within early year classrooms.

One method is to ensure Initial Teacher Education (ITE) programs are well-equipped to teach pre-service teachers the science underpinning reading development and instruction, as well as methods to lift pre-service teachers' own knowledge of spoken and written language structures to ensure *no pre-service teacher is left behind* when it comes to being graduate-ready to effectively teach children how to read. Two skills that are widely known to influence early word recognition skills are phoneme

awareness and letter-sound knowledge. These two skills are powerful predictors of how well children will learn to read and spell in the first two years of school and therefore pre-service teachers with aspirations to work in Foundation, Year 1 and Year 2 classrooms should have a strong grasp of how to assess and instruct in these critical areas (Hulme, Bowyer-Crane, Carroll, Duff, & Snowling, 2012). As an initial starting point, and as part of a larger body of research being undertaken in ITE programs at one Australian university, this master's project aimed to develop and evaluate the appropriateness of a supplementary online program designed to raise final-year pre-service teachers' knowledge of the science surrounding word-level reading assessment and instruction for early year classrooms.

Method: A mixed methods design consisting of three stages was used to design and pilot an online, evidence-based, supplementary professional learning program for final-year ITE students. The *first* methodological stage involved sourcing appropriate content via Quartile 1 journals, national and international government policy documents and reports, and credible websites. The *second* stage focused on the evidence-informed construction of an online supplementary program covering eight essential modules (e.g., Module 1: Foundations of Literacy Acquisition – The big picture, Module 2: Phonological Awareness, Module 3: Structured Literacy Instruction, Module 4: Phonics, Module 5: Knowledge of Diverse Reading Profiles, Module 6: Assessment, Module 7: More on Assessment, Module 8: Joining the Dots). The *third* stage involved collation of multi-disciplinary and end-user survey feedback from 10 participants, including education academics, a speech-language pathologist, in-service teachers and pre-service teachers, regarding the appropriateness of *content*, *appearance*, *usability* and *credibility* of the online supplementary program.

Result: Quantitative and qualitative data was analysed from a survey tool administered in *stage three* of this master's project in order to profile multi-disciplinary and end-user feedback regarding the appropriateness of *content, appearance, usability* and *credibility* of the online supplementary program. Overall 78% of participants agreed that the content, appearance, usability and credibility of the eight-module supplementary program are appropriate and therefore likely to be effective in raising final-year ITE students' knowledge and understanding of how to instruct and assess word level reading skills. Specifically, 76% of participants agreed that the *content*, and 95% agreed that the *credibility*, as thoroughly sourced and addressed in the first stage of the method, was appropriate. Further, 80% of participants agreed that the *appearance*, and 62.5% agreed that *useability*, as crafted using evidence-informed features and functions identified in stage two of the method, were appropriate. Qualitative data provided supportive comments on the helpfulness and extensiveness of the content; the importance of having visual (appearance) breaks from reading text and to consolidate understanding through multi-modal means such as the video demonstrations; the need for refinement to heighten usability satisfaction; and the value of credible and trustworthy resources.

Implications: Aligned with current Australian Government priorities, the focus of this master's project can be viewed as one method of providing additional learning opportunities within ITE programs to ensure *no pre-service teacher is left behind* when it comes to teaching reading skills. As part of this project, several features for refinement were identified and are discussed to ensure such a supplement can be effectively piloted with a large cohort of final-year ITE students in the future.

Declaration

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

I certify that chapters 1, 2 and 3 of this master's thesis received editing limited to formatting, grammar and APA-style support by Elite Editing and was overseen by my primary supervisor.

I also certify that the research reported in this thesis has been approved by the Flinders University Human Ethics Committee - Ethics Project Number 8405.

Signed: **On:** 28/11/2019

Kelly Neumann

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List of Abbreviations

ACER	Australian Council for Educational Research
AEDC	Australian Early Development Census
AITSL	Australian Institute for Teaching and School Leadership
ILA	International Literacy Association
ITE	Initial teacher education
LANITE	Literacy and Numeracy Test for Initial Teacher Education
NCTE	National Council of Teachers of English
NICHHD	National Institute of Child Health and Human Development
NITL	National Inquiry into the Teaching of Literacy
OECD	Organisation for Economic Co-Operation and Development
PA	Phoneme awareness
PCK	Pedagogical content knowledge
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
PPL	Principles of powerful learning
Q1	Quartile 1
RR	Reading Recovery
SVR	Simple view of reading
TCK	Technological content knowledge
TPACK	Technological pedagogical content knowledge
TPK	Technological pedagogical knowledge
UNICEF	United Nations International Children's Emergency Fund
WLF	World Literacy Foundation

Chapter 1: Introduction

1.1 Introduction

Teaching young children to read is recognised as key to increasing their lifelong capacity for academic, vocational and economic success (Comber, 2015; Kutner et al., 2007; Snow & Woodward, 2017; World Literacy Foundation [WLF], 2015; Zheng, Erickson, Kingston, & Noonan, 2014). However, a large number of school-age children in Australia struggle to read (Australian Council for Educational Research [ACER], 2017). Initial teacher education (ITE) programs have recently been identified as a key component for increasing reading success in Australian classrooms by supporting pre-service teachers' understanding of the science underpinning skilful reading instruction (The Hon Dan Tehan MP, 2019). ITE programs provide the ideal environment to ensure pre-service teachers are highly knowledgeable in the science of reading instruction and are able to recognise myths and pseudoscientific reading methods that may prevail in schools in which they are eventually employed (International Literacy Association & National Council of Teachers of English, 2017).

According to international research (e.g. Ehri et al., 2001; Rose, 2006; Rowe & National Inquiry into the Teaching of Literacy [NITL] [Australia], 2005; Snow, Burns, & Griffin, 1998), explicit and systematic teaching of the five key pillars of reading, i.e., phoneme awareness (PA), phonics, reading fluency, vocabulary knowledge and reading comprehension strategies, will lead to reading success. However, a decade of research has demonstrated that these aspects are often less than optimal in ITE programs, contributing to low levels of linguistic knowledge among large numbers of in-service teachers (International Literacy Association & National Council of Teachers of English, 2017). Since 2016, in an effort to raise teacher literacy and numeracy standards, the Australian Government has implemented the Literacy and Numeracy Test for Initial

Teacher Education (Department of Education, 2015). In 2017, the South Australian Government introduced and mandated Year 1 Phonics Checks (South Australia Department for Education, 2017). In 2019, the Australian Federal Minister for Education called for all ITE programs to systematically focus on evidence-based teaching of reading and established the Australian Institute for Teaching and School Leadership (AITSL) taskforce to find the most effective way of ensuring that all pre-service teachers receive fundamental teaching in the five essential elements most important to early literacy success (Tehan, 2019).

In line with national priorities (Tehan, 2019), the purpose of this master's study is to develop and seek feedback from experts (i.e. academics, psychologists and speech-language pathologists) and in-service and pre-service teachers about the quality of an online supplementary program designed to ensure that pre-service teachers will understand and adopt the science of reading instruction in early year classrooms. The online program specifically focuses on skills that underpin word-level reading, namely PA and letter–sound knowledge (i.e. phonics). Henceforth, the term phonics is used to refer to the teaching method of letter–sound correspondence.

1.2 The Importance of Reading

Research suggests that students who do not experience reading success in their early years of schooling are at greater risk of long-term negative effects, including poor academic results (Cunningham & Stanovich, 1997), reduced cognitive ability (Stanovich, 1986), low self-esteem (Rose, 2006), lower academic engagement (Snow & Woodward, 2017), increased dropout rates (Bost & Riccomini, 2006), behavioural difficulties (Mash & Wolfe, 2002), mental health difficulties (Willcutt & Pennington, 2000), reduced employment opportunities and social exclusion (Brynner, 2008; Kutner et al., 2007). The cost of illiteracy is not only individual. The WLF (2015) has identified

illiteracy as a global crisis, which costs developed countries 2% of their gross domestic product. Despite the wealth of some countries, 796 million people globally are 'trapped in the cycle of poverty' (WLF, 2015, p. 4), which is linked to the social and economic impact of illiteracy. Australia is no exception—7 million Australians remain functionally illiterate at an annual cost of more than 30 billion AUD that is spent on health and welfare services as a result of the before mentioned long-term risks (WLF, 2017). The individual and societal cost of illiteracy means that an understanding of how reading develops, how it is taught and assessed and how well ITE programs prepare new teachers is an essential focus for scholars, global leaders, politicians, educators, parents and families.

Recent reviews have indicated that approximately one in five school-age children in the developed world do not meet baseline literacy levels (Organisation for Economic Co-Operation and Development [OECD], 2004; United Nations International Children's Emergency Fund [UNICEF], 2017). Further, reading performance in 30 of the 39 countries included in the 2015 Programme for International Student Assessment (PISA) (OECD, 2015) has regressed since 2012 (UNICEF, 2017). The 2016 *Progress in International Reading Literacy Study* (PIRLS) (ACER, 2017) ranked Australia 28 out of 50 countries globally, and while improvements were noted from 2011 to 2016 for children aged approximately 10 years, they occurred primarily for advanced readers rather than for those most at risk of reading difficulties. Of concern were the 20% of Australian students who did not reach the intermediate benchmark based on PIRLS data (ACER, 2017). This means that one in five students struggled to complete reading comprehension activities, including locating various types of information, recounting key ideas and making simple inferences from textual information. Potentially pre-empting school-age children's reading results, the Australian Early Development

Census (AEDC) (2017) has indicated that 24% of 5-year-old Australian children are classified as 'developmentally at risk', meaning that they have scored between the 10th and 25th percentile (AEDC, 2009) in language and communication skills needed for early reading success. Despite these worrying figures globally and nationally, research has clearly indicated five key cognitive skills (or pillars) that are pivotal for supporting young learners in becoming proficient readers. In South Australia, the state in which this master's project was undertaken, the Department for Education has collectively termed these five key cognitive skills along with a sixth element as the 'Big Six'.

1.3 Key Pillars of Reading Success

International research (e.g. Ehri et al., 2001; Rose, 2006; Rowe & NITL [Australia], 2005; Snow et al., 1998) has shown that the educational experiences of children in developed countries differ significantly because of inconsistencies in reading instruction. Extensive reviews of the research have consistently indicated that students learn best when teachers use an integrated approach to reading instruction that explicitly teaches PA, letter–sound knowledge, fluency, vocabulary knowledge and comprehension strategies (Hempenstall, 2016). These five key pillars have been established as the cornerstone to reading acquisition for all children, regardless of whether they experience reading difficulties or not. In South Australia, the importance of a strong oral language foundation when learning to read has been acknowledged. Together with the five aforementioned key pillars, this addition has resulted in the promotion of the Big Six by the former Department of Education and Child Development (Australian Primary Principals Association, 2009). In essence, reading is recognised as a multifaceted and complex synthesis of a range of cognitive operations that allow a child to construct meaning from print (Castles, Rastle, & Nation, 2018).

Learning to read requires the integration of oral language, PA, letter–sound knowledge, fluency, vocabulary knowledge and comprehension:

- Oral language is an agreed system of communication and includes spoken and written modalities and five key domains (phonology, morphology, syntax, semantics and pragmatics) (Bornstein, Hahn, & Putnick, 2016; Bornstein, Hahn, Putnick, & Suwalsky, 2014; Klem et al., 2015; Lervåg, Hulme, & Melby-Lervåg, 2017).
- PA is the ability to manipulate individual sounds in written words and provides a map against which letters can be plotted (Ehri et al., 2001). This is a critical subset of phonological awareness that begins with the recognition of units of spoken words such as syllables and onset-rime units (Schuele & Boudreau, 2008). Section 1.4.1 provides specific details on the importance of PA, its link to reading and its role in the current master's project.
- Letter–sound knowledge is the ability to understand the association between speech sounds and their written symbols (Adams, 1990). Section 1.4.2 provides specific details on the importance of letter–sound knowledge, its link to reading and role in the current master's project.
- Fluency is the ability to read quickly, accurately and with expression (Carnine, Silbert, Kame'enui, Tarver, & Jungjohann, 2006).
- Vocabulary knowledge refers to knowledge of words that children need to be able to recognise, understand and use for proficiency in language, communication, reading and writing (Carnine et al., 2006).
- Reading comprehension strategies are the strategies children use to make meaning from text such as inferencing and making predictions (Arya, Yu, Diana, & Jing, 2018).

Researchers have identified the need to integrate these six skills to ensure successful independent reading (Australian Primary Principals Association, 2009). Further to this, research recognises the necessity of accurate representation of speech sounds via well-attuned auditory pathways (Kraus & Anderson, 2013). A diverse range of experts (e.g. Kraus & Anderson, 2013; OECD, 2005; Rose, 2006; Rowe & NITL [Australia], 2005; Snow et al., 1998) have agreed that these prerequisite skills are likely to establish a firm foundation from which children will prosper in their reading development. Although the researcher recognises that the six aforementioned skills must be part of any effective reading program, the focus of this master's project is on the two skills that have been identified as early key predictors for future word reading success—PA and letter–sound knowledge (Carson, Gillon, & Boustead, 2013; Hulme, Bower-Crane, Carroll, Duff & Snowling, 2012; Hulme & Snowling, 2013). Likewise, findings from the research across many languages has consistently recognised the powerful influence of PA and letter–sound knowledge on children's early reading development (for reviews, see Gillon, 2018; Hulme & Snowling, 2013; Moll et al., 2014; Russell et al., 2018). The following sections provide insights into these skills and their relationships for decoding at the word level (i.e. word recognition).

1.4 Key Skills for Decoding at the Word Level

Languages with an alphabetic system require new readers to map phonemes (sounds) to graphemes (symbols) or groups of graphemes. This becomes complex when attempting to learn the relationships between the sounds and spellings of the English language in which approximately 44 phonemes must be mapped using 26 graphemes (Gillon, 2018). Comprehensive research has revealed strong evidence for explicit PA and letter–sound knowledge instruction during the early stages of reading development (e.g. Bryant, Maclean, Bradley, & Crossland, 1990; Castles & Colheart, 2004; Lonigan,

Burgess, & Anthony, 2000; McGeown, Medford, & Moxon, 2013; Muter, Hulme, Snowling, & Stevenson, 2004; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Wagner & Torgeson, 1987; Wagner et al., 1997).

1.4.1 **Phoneme awareness and learning to read.** PA is a metalinguistic awareness skill, meaning that it involves being able to hear and then think about the structural features of language (Gillon, 2018), and is a critical subset of phonological awareness. PA refers to the ability to focus on the sounds within rather than the meaning of spoken words (Konza, 2014). Schuele and Boudreau's (2008) sequence of phonological awareness development (see Figure 1.1) demonstrates the progression towards PA skills. Phonological awareness generally begins with an awareness of syllables followed by onset and rime (e.g. the word *stamp* can be separated into its onset *st* and its rime *amp*) and progresses to more complex skills such as deleting and manipulating phonemes (e.g. if the initial sound in the word *thud* is deleted and replaced with the sound *m,* the word becomes *mud*). These skills have not yet been related to print; however, a vast amount of research has identified that phonological sensitivity plays a critical and causal role in the normal acquisition of reading (Adams, 1990; Gillon, 2018; Wagner & Torgesen, 1987). Paulson and Ashmore (2004) found that young children typically develop awareness of larger linguistic units such as syllables before smaller units such as individual phonemes, with the easiest phonological skills to learn being the ability to blend and segment syllables, detect rhyme and group initial sounds in words. Hulme et al. (2012) determined that reading interventions that included instruction in PA paired with letter–sound knowledge led to improvements in these skills as well as word-level reading and spelling five months after the intervention

had finished. The authors concluded that PA and letter–sound knowledge were two causal influences on the development of children's literacy skills.

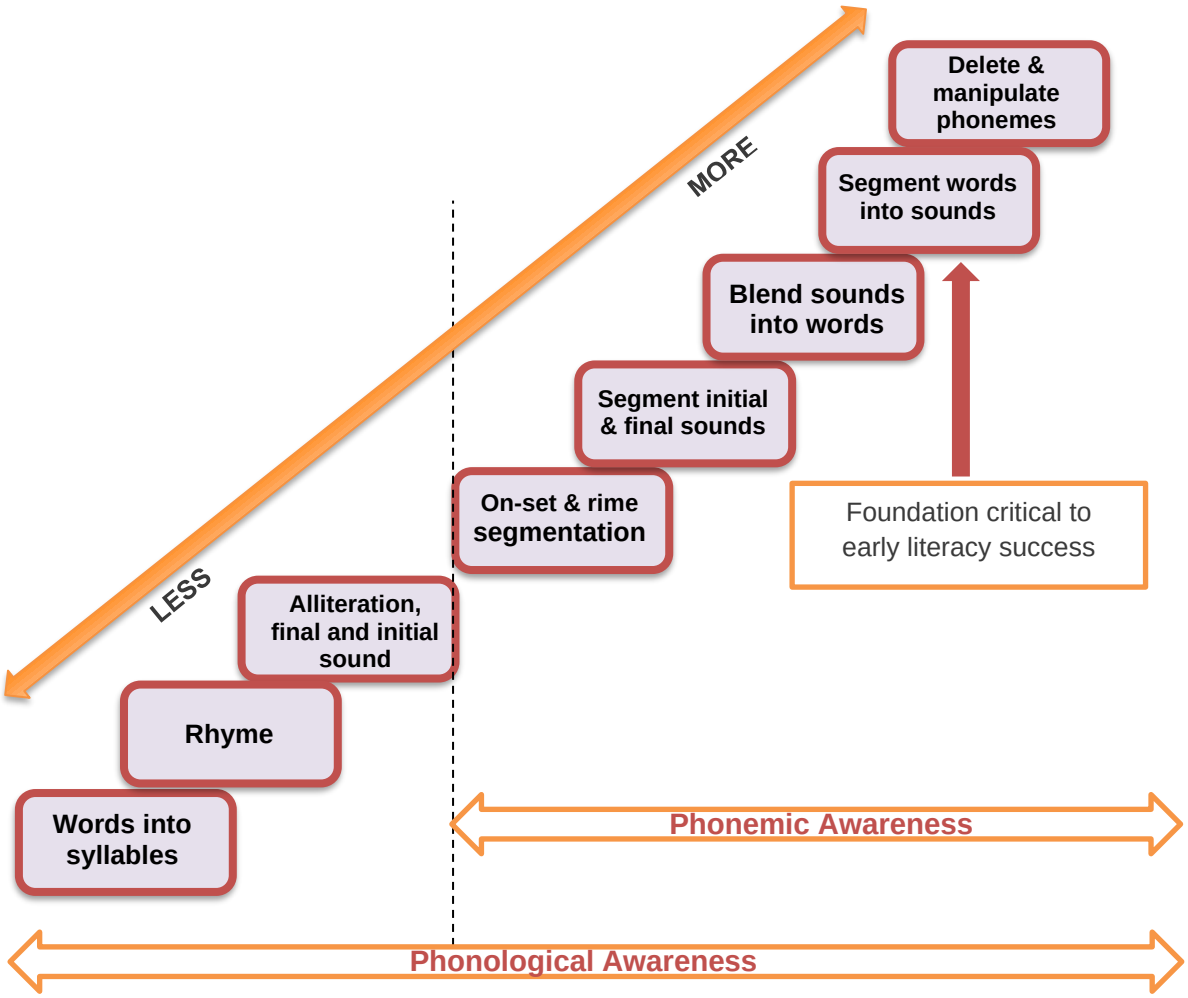

Figure 1.1. *Diagram of PA skill development. Reprinted from 'Phonological awareness intervention: Beyond the basics, by C. M. Schuele and D. Boudreau, 2008,* Language, Speech, and Hearing Services in Schools, 39*(1), 3-20.*

1.4.2 **Letter–sound knowledge and learning to read.** Once children can divide spoken words into their individual sounds, they can progress to mapping these sounds to the written alphabetic code—this relationship is known as letter–sound knowledge. The mapping of sounds to symbols is central to learning to read and a compulsory step if children are to become independent readers (Hulme et al., 2012). A systematic method of teaching letter–sound knowledge generally involves mapping individual sounds represented by a single letter (e.g. the sound /a/ is represented by *a*), followed by mapping digraphs—sounds represented by two letters, including consonant digraphs (e.g. /th/, /ck/, /sh/ and /ch/) and vowel digraphs (e.g. /ae/, /ee/, /ie/, /oo/ and /ou/)—until all 44 sounds of the English language are mapped. This is followed by teaching blends—two or more sounds that are represented by two or more letters but merge fluently together (e.g. /st/, /mb/ and /scr/), multisyllabic words, words with prefixes and suffixes, words with Greek or Latin roots and, finally, compound words.

The importance of PA and letter–sound knowledge in learning how to decode the alphabet when learning to read has been well established in studies that have validated their importance as integral parts of several prominent theories and models of how children learn to read (Rose, 2006; Catts, Herrera, Nielsen, & Bridges, 2015).

1.5 Theories of Word Reading: Component Model and Simple View of Reading

The importance of PA and letter–sound knowledge with respect to their early predictive power for reading outcomes and instructional strength when guiding children towards skilled reading outcomes cannot be viewed in a vacuum in terms of effective classroom reading practices. The component model of reading (Aaron, Joshi, Gooden, & Bentum, 2008) (see Figure 1.2) offers classroom teachers a framework through which to view the relationships between successful long-term reading outcomes. The

component model of reading comprises three domains: cognitive, psychological and ecological.

The psychological domain focuses on variables such as motivation, self-efficacy, locus of control and perceived teacher expectations. The ecological domain includes environmental factors such as culture, family and home life, parental support, peer influence, classroom environment, dialect and first language. While these domains both play an important role in successful reading outcomes, the cognitive domain is recognised as having the most direct influence on reading acquisition (Gillon, 2018). The cognitive domain focuses on skills involved in reading accuracy (i.e. accurate word recognition) and comprehension, including PA, letter–sound mapping and vocabulary knowledge (Aaron et al., 2008).

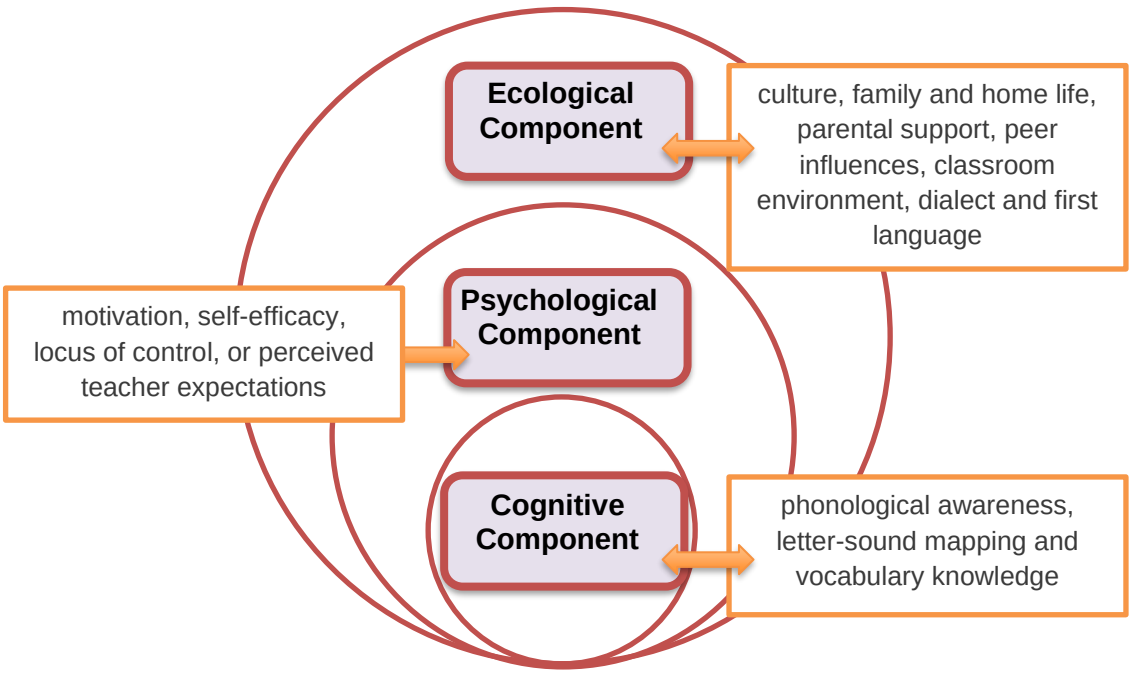

Figure 1.2. Component model of reading. Adapted from 'Diagnosis and treatment of reading disabilities based on the component model of reading: An alternative to the

Discrepancy Model of LD', by P. G. Aaron, R. M. Joshi, R. Gooden and K. E. Bentum, 2008, *Journal of Learning Disabilities, 41*(1), 67-84.

Theories about skilled reading have emphasised the importance of accurate word recognition in the development of reading comprehension (Gough & Tunmer, 1986; Perfetti, 1985; Stanovich, Nathan, & Zoloman, 1988). Although a range of linguistic skills contributes to reading comprehension, word recognition has been found to account for many variances in performance (Catts et al., 2015). Over the decades, a number of models have been proposed to explain word recognition ability. These models, which have often been built from previous models, include the dual-route model (Morton & Patterson, 1980), the modified dual-route model (Chang, Fube, & Welbourne, 2012), the analogy model (Barron, 1986; Ehri, 1992; Humphreys & Evett, 1985), the connectionist model (Seidenberg & McClelland, 1989), the interactive model of word recognition (Rumelhart, 1977) and the three-cueing model (Routman, 1994). See Gillon (2018) for descriptions of the aforementioned models.

A model that has been used by hundreds of studies to guide their investigation and/or interpret their results (Language and Reading Research Consortium, 2015; Aaron, Joshi, Williams, 1999), leading to significant developments in our understanding of reading comprehension (Catts, & Vaughn, 2018) is the simple view of reading (SVR) model (Gough and Tunmer, 1986). The SVR underpins the theoretical framework of this master's thesis. The SVR considers two key components for skilled reading: word recognition and language comprehension (see Figure 1.3). The first component of this model, word recognition, defines decoding as more than simply sounding out individual letters. Rather, skilled word recognition involves the ability to read isolated words fluently, accurately and silently. Gough and Tunmer (1986) have argued that word

recognition skills (in an alphabetic orthography) are highly dependent on skilled decoding (knowledge of the letter–sound correspondence rules), which allows readers to recognise the majority of English words. For the remaining English words, Moats and Tolman (2009) refer to their spelling as being on a continuum from perfectly regular to a little odd to odd, stating that approximately 4% of all English words are truly irregular. Accurate spelling of approximately 50% of all English words is done through direct sound–symbol correspondence, while a further 36% can be spelled accurately using the same method except for one speech sound (typically a vowel) (Moats & Tolman, 2009). Catts and Vaughn (2018) emphasises that word recognition is most important in the early stages of reading development as reading comprehension relies heavily upon fluent decoding.

The second and equally important component of the SVR model is language comprehension, which is understood as a range of skills such as vocabulary, syntactic (i.e. structure of sentences) and morphological (i.e. structure of words) knowledge, which co-develop and are co-dependent (Bornstein et al., 2014; Bornstein et al., 2016; Klem et al., 2015; Lervåg et al., 2017). Reading comprehension—the ability to extract and construct literal and inferred meaning from linguistic discourse represented in print—is the product of word recognition processes and language comprehension processes, which operate together rather than in isolation.

In their assessment of the SVR, Hoover and Tunmer (2018) explicitly state that this model is dynamic because it provides a picture of reading development based on capturing relative successive progression of the two skills—word recognition and comprehension—at any given point. The SVR cannot show how these skills will develop; rather, that their successive development is imperative for skilled reading. Following the Rose (2006) report in which the SVR was used as a model for teaching

reading, the SVR has been used to highlight the necessity of explicit teaching of PA and letter–sound knowledge to advance word recognition skills. Further studies, including NITL (Rowe & NITL [Australia], 2005) and the National Reading Panel (2000), have concluded that the five aforementioned key pillars of reading success (or six in the case of South Australia) are critical components in developing word recognition and language comprehension under the SVR framework. Catts et al.'s (2015) research using the SVR model to determine the early precursors of reading comprehension has shown that word recognition contributes greatly to the prediction of reading comprehension. Assessment of word reading precursors in American kindergartens (5–6 years in America), including PA and letter–sound knowledge, predicted later reading comprehension success at the end of third grade (Catts et al., 2015). Further, in a longitudinal study, Catts, Hogan & Adlof (2004) identified that the contribution of word recognition and language comprehension to reading comprehension ability varied based on a child's stage of reading development. For example, in the early grades, word recognition explained the variance in reading comprehension scores to a greater degree than did language comprehension ability. As children progressed through school, language comprehension explained the variance in reading comprehension scores to a greater degree than did word recognition ability. Such information is critical for teachers to prioritise skills for individual children's reading stages. Importantly, models of reading development, especially the SVR, provide a foundation upon which evidence-based approaches to class-based assessment and instruction can be derived. However, this has not been at the forefront of Australian reading education over the last three to four decades.

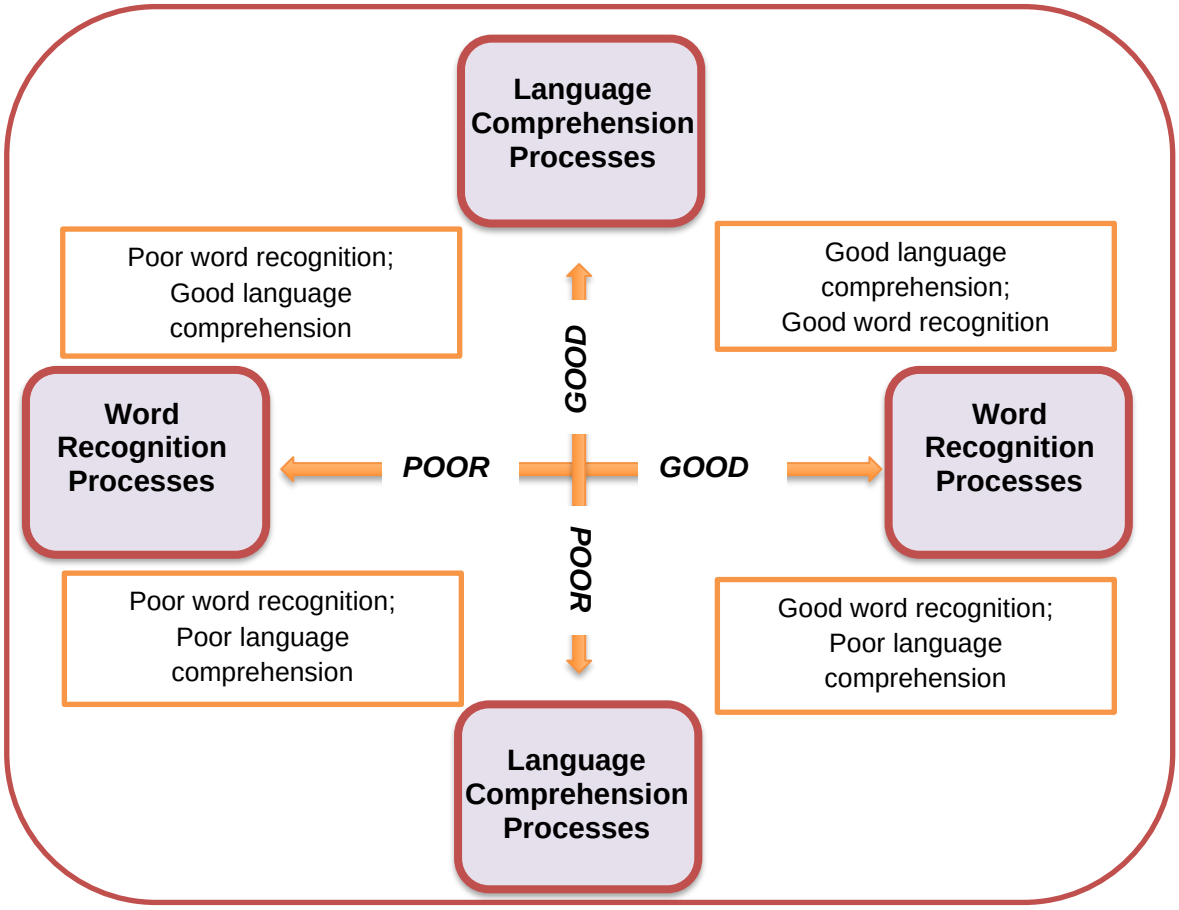

Figure 1.3. Simple view of reading. Adapted from 'Decoding, reading, and reading disability', by P. B. Gough and W. E. Tunmer, 1986, *Remedial and Special Education, 7(*1), 6-10.

1.6 Approaches to Teaching Reading

Historically, a number of approaches to teaching reading (e.g. whole language and balanced literacy instruction) have been in direct contrast to the research evidence on how children best learn how to read. Currently, there is a shift towards the five key pillars of reading success in the early years of schooling (i.e. the first two to three years of formal education), which the Federal Minister of Education has highlighted as being fundamental components of all ITE programs (Tehan, 2019). Research shows that gaps

in reading knowledge in the early years are an underlying cause of reading difficulties over time (Catts et al., 2015). The following sections outline the various approaches to teaching reading in Australian schools and their relationship to the literature on how to best teach children how to read.

1.6.1 **Whole language.** The whole language philosophy (Altwerger, Edelsky, & Flores, 1987), which has dominated reading instruction since the 1970s, is aligned with the Rousseauian perspective of the 1700s (Weir, 1990). During this period, it was believed that children exposed to a language-rich environment would learn to read as effortlessly as they learned to speak, and any attempt to instruct a child would only hamper this natural process. Jean Piaget's (1932) constructivist theory on the cognitive development of children, which posited that learning is a metacognitive process that develops from experience and involvement, also supports the whole language approach. Whole language advocates propose that speaking and reading are 'psychologically and biologically equivalent vehicles for language' (Liberman & Liberman, 1990, p. 55). Although it has no defined activities, whole language theory is most easily understood as a 'whole to parts' process in which children themselves are a part of the teaching and learning process, encouraging risk taking, connecting intrinsically to authentic speech and making meaning from text rather than focusing on specific mechanical details (Goodman, 1986). Examples of whole language activities include repeated book reading or use of flash cards in which children are expected to commit whole words to memory.

Although studies have confirmed that the whole language approach is not as effective as other methods of teaching children to read (Edwards & Potts, 2008; Hempenstall, 2005), it is still widely used in Australian classrooms. Further, critics argue that it is associated with reading difficulties because it is in direct opposition to the explicit and systematic method of teaching the key pillars of reading success, thus

contributing to the one in five Australian children who do not meet baseline literacy levels (ACER, 2017). According to Gough and Tunmer's (1986) SVR model, the whole language approach omits one key factor—word recognition—and focuses on language comprehension as the sole mode for reading success.

The whole language approach, which was promoted in the 1900s and focuses on making meaning from text rather than decoding words, has been found to have consequences for readers in their later school years because they are unable to use their understanding of the structure of known words to decode unfamiliar words (Hempenstall, 2005). Children who learn to read using the whole language approach are not explicitly taught how to decode unfamiliar words, thus reach a ceiling in their reading ability (Moats, 2000; Tunmer & Hoover, 1993). The teaching of reading in Australia mimics that in other parts of the world, and methods that have shown to be less effective for all readers continue to be used (Edwards & Potts, 2008; Hempenstall, 2005). Current practices in Australia and South Australian schools that align with the whole language philosophy include the multiple cueing system, otherwise known as the three-cueing system in which the meaning of text is sought by synthesising its semantic, syntactic and initial sound cues (Stark, Snow, Eadie, & Goldfeld, 2016), and Reading Recovery ([RR] Clay, 1994), an intervention based on the theory that new readers draw from multiple sources of information when learning to read, including using predictive strategies such as looking at pictures, referring to the context of previous passages and drawing on their prior knowledge of the text rather than focusing on decoding the printed words on a page (Chapman, Greaney, Arrow, & Tunmer, 2018; Reading Recovery Council of North America, 2015).

Reading Recovery (RR) prompted the use of natural language levelled readers, which have been found to be incompatible with the phonics approach to teaching word

recognition (Chapman et al., 2018). The New South Wales Department of Education has recently removed RR as a reading intervention, citing evidence from Bradford and Wan's research (2015) whose results showed there were no long-term positive effects on students' NAPLAN Reading performance in Year 3. Further, Bradford and Wan (2015) concluded that students who participated in RR achieved significantly lower scores on the Year 3 NAPLAN Reading assessment compared to their non-RR counterparts, regardless of students' starting ability.

1.6.2 **Balanced literacy instruction.** Similar to the whole language approach, balanced literacy instruction is a philosophical perspective that considers the kinds of knowledge that are important for children to develop and how that knowledge should be attained when learning to read (Fitzgerald, 1999). Studies by Baumann and Ivey (1997) and Cunningham and Hall (1998) have informed this perspective (Fitzgerald, 1999). Fitzgerald and Cunningham (2002) have proposed that the theory behind a balanced approach to teaching reading is that the reader must have the ability to understand and respond to what is read and possess specific abilities such as 'word-getting routines and strategies' (p. 354). The balanced approach to literacy instruction includes both a bottom-up approach, which builds on the decoding skills of reading (e.g. phonics), and a top-down approach, which supports comprehension of textual meaning (e.g. whole language). Hastings (2012) has argued that effective teachers draw on both of these methods when teaching reading, stressing the importance of reading processes that help to crack the alphabetic code of the written word and reading as an interactive process of meaning making, predicting, testing and confirming these predictions. Other strategies focus on memorisation of whole words and their meanings and shapes. Balanced literacy instruction is a constructivist approach whereby students are the makers of meaning and skills are taught in context while reading authentic texts. This model is

promoted by those who perceive that reading and writing should be part of a holistic approach to education in which students are the authors of their own learning rather than following a systematic approach to learning early reading skills (Weaver, 1998). A systematic approach has been identified as the most effective means of reading instruction (Rose, 2006).

Phonics. Phonics is an instructional approach that emphasises mapping sounds to alphabetic symbols, relying heavily on PA skills (Henbest & Apel, 2017). There are various subgroups of phonics instruction, including top-down approaches, which rely on learning in the context of whole or parts of words and can be equated with embedded literacy instruction (Gillon, 2018; Stahl, Duffy-Hester, & Dougherty Stahl, 1998), and bottom-up approaches, which emphasise letter–sound correspondences without respect to context and are aligned with explicit and systematic approaches to teaching letter–sound knowledge.

1.6.2.1 Top-down approaches to phonics. Embedded literacy instruction is a top-down approach that teaches students to read from the whole to the parts (Stahl et al., 1998). This instructional model teaches skills incidentally as they surface through the reading of authentic text. Teachers highlight letter–sound correspondences as they arise, although not so much that it prevents the student from engaging in the text itself. The learning of letter–sound knowledge is embedded in the content of reading and is presented as the teacher sees necessary and appropriate for student learning. Some children can acquire decoding skills using this method; however, this tends to arise from a literacy-rich home environment in which they have had thousands of hours of literacy experiences upon which to build before being exposed to formal reading instruction at school. For children who have not had this exposure, an embedded or implicit model of instruction is too fleeting and random to piece together the letter–sound relationships of

the English language. Although reading aloud is an essential part of providing a language- and literacy-rich early schooling environment, it does not provide the foundation for the key early reading skills of letter–sound knowledge that allow all students to decode unfamiliar and familiar words (Johnston, McGeown, & Watson, 2012). Two examples of phonics instruction that may be aligned with the top-down approach are analytic phonics and analogy phonics.

Similar to the whole language approach, the analytic phonics approach to teaching letter–sound knowledge emphasises moving from the whole to the parts (Stahl et al., 1998). Beginning with whole words, the child's attention is drawn to analysing particular parts of words so that letter–sound relationships are learned in the context of whole words (Ehri & McCormick, 1998). Children are not required to learn sounds in isolation or blend sounds together; rather, they learn by referring to words that begin with the same sound (e.g. *bee*, *butter*, *bate*). Children are asked to speak the words and make note of the similarities between sounds and letters. Once the 26 initial letters have been learned, the process is duplicated to draw attention to middle sounds and then to final sounds. When children discover an unfamiliar word, they are encouraged to separate the word into onset and rime (e.g. *shake*, *bake*, *take*, *rake*). At this point, the synthetic phonics and analytic phonics programs have elements in common because they both use word families to highlight the same sound–letter combinations.

Analogy phonics supports children in applying parts of words that they have already learned to new words; for example, translating the rime section of a known word and applying it to an unknown word (e.g. the rime /all/ from the word *tall* can be used to read the new word *ball*) (Stahl et al., 1998). This is a similar skill to that taught later in the synthetic phonics program in which students blend clusters of sounds. However, by the time they are involved in a synthetic phonics program, children have

already mastered the more simplified letter–sound correlations and can build upon these simple skills to quickly acquire more complex letter–sound clusters.

For both analogy phonics and analytic phonics, children are asked to use parts of words to decode new words. This strategy may be suitable for accomplished readers but does not provide beginner readers with sufficient details to become skilled independent readers (Johnston et al., 2012). Johnston et al.'s (2012) research has highlighted the inferior reading comprehension and spelling performance of boys who were instructed using analytic phonics compared with girls instructed using synthetic phonics. Unlike the explicit and systematic phonics approach, which is central to this research, the long-term effects of the embedded phonics approach have been found to diminish over time. Indeed, children at risk of reading difficulties exposed to the synthetic phonics teaching approach have showed a strong improvement with an effect size of 0.36 at the end of first grade (Johnston et al., 2012). After the second grade, the effect size had risen to 0.45 (Johnston et al., 2012).

1.6.2.2 Bottom-up approach to phonics. Explicit and systematic instruction is a bottom-up approach designed to direct children's attention to a specific skill and provide practice opportunities that enhance their understanding of this skill. This model is designed to be effective for children from a range of backgrounds and reading levels because its deliberate practice builds strong neural pathways between the skill and its application (Mills, 2018). Explicit instruction is an approach to teaching that focuses on the child's attention on specific key skills. An example of this is writing a lower-case *t* on the board and directing the students' attention to it by saying, 'This is a *t*. Let us all say *t* together. What sound does this say?' This verbal direction could be accompanied by an action that behaves as a reminder. Once children have had the opportunity to practise articulating the sound and respond correctly when the letter is presented, they

are then given multiple interactive opportunities to practise to ensure a strong neural pathway is built between the letter symbol and letter sound (Yeagle, 2017).

Explicit and systematic instruction recognises that some skills must be taught before others; thus, skills are best developed in a particular sequence—this is also referred to as structured literacy instruction. Evidence supports explicit and systematic instruction specifically for children with literacy disabilities and difficulties and those at risk (Nelson-Walker et al., 2013). It is important when teaching reading in English that letter–sound knowledge is taught systematically to ensure that all sounds are taught explicitly. While the order in which letter–sound knowledge is taught may differ between programs, all programs teach the most common sounds first, typically the six letters *s, a, t, p, i* and *n* because they can be translated into a range of consonant-vowel-consonant words. Supported by the introduction of high-frequency sight words such as *and, the* and *was* and repeated opportunities to observe these words together in specifically created decodable texts, children are able to cement new knowledge quickly. An explicit and systematic program does not leave learning to read to chance. A bottom-up phonics instructional approach is the synthetic phonics approach, which is the phonics approach adopted in this research.

The synthetic phonics approach to letter–sound knowledge instruction is currently supported by empirical evidence as an effective means of teaching beginner readers (Johnston & Watson, 2003, 2005; National Institute of Child Health and Human Development [NICHD], 2000; Rose, 2006; Rowe & NITL [Australia], 2005). Synthetic refers to the ability to synthesise or blend individual phonemes rapidly to form complete words, a necessary capacity for comprehension, which is the primary goal of reading (Shapiro & Solity, 2016). This bottom-up approach is designed to be explicit and systematic and supports children to learn that reading requires blending together and

pulling apart sounds of language. The synthetic phonics approach moves from the parts to the whole, enabling children to quickly piece together unknown words from sounds that they have already learned. Synthetic reading programs such as Making Up Lost Time In Literacy (Macquarie University, 2007) begin with the simplest concepts such as single sound–letter mapping (e.g. *m, t, a, i* and *s*) and progress to the most complex concepts such as r-controlled vowels and various spelling patterns of long vowel sounds (e.g. *i*/*igh*/*ie*/*y*)

Unlike the aforementioned methods of reading instruction, the bottom-up method of synthetic phonics has been shown to be most effective with all students. Sermier Dessemontet, Martinet, de Chambrier, Martini-Willemin and Audrin's (2019) meta-analysis on the effectiveness of phonics instruction for teaching decoding skills to students with intellectual disabilities concluded that synthetic phonics is as effective for children with developmental differences as it is with typically developing students. Further, synthetic phonics has been shown to be more effective that the analytic approach for all children, regardless of their school-entry PA skills (Johnston & Watson, 2004). In 1998, Louisa Moats stated that an explicit and systematic approach to teaching reading may appear directive to teachers who attended ITE programs in the 1980s and 1990s when the whole word philosophy was prioritised but that the evidence clearly shows it to be a more effective approach to teaching reading (NICHD, 2000; Rose, 2006; Rowe & NITL [Australia], 2005). Further, Johnston and Watson's (2019) seven-year follow-up study, *A Seven Year Study of the Effects of Synthetic Phonics Teaching on Reading and Spelling Attainment*, concluded that an explicit and systematic program was superior to the analytic approach for boys and girls from disadvantaged backgrounds, a demographic that typically underperforms (Duncan & Seymour, 2000). The study found that children from this demographic performed as

well as children from advantaged backgrounds for most of their primary school years when taught using an explicit and systematic approach and continued to perform at or above their chronological ages in word reading, spelling and reading comprehension past Grade 7. Further, Johnston and Watson's research (2003, 2005) convincingly demonstrates that a systematic phonics program supports comprehension development because children who are accurate and can automatically identify words have more cognitive energy to apply to comprehending what they read.

The controversy about how best to teach children to read is not new (Hempenstall, 1997) and has contributed to the gradual shift away from outdated methods towards contemporary evidence-based approaches to teaching children to read. Given that research into how best to teach children to read is gaining attention (Tehan, 2019), deficits in current reading instruction methodologies, teachers' linguistic knowledge and gaps in ITE programs are becoming clearer and must be addressed.

Chapter 2: Tackling Poor Reading Outcomes Through Initial Teacher Education Programs

2.1 Introduction

Given the prevalence of reading difficulties in Australia (ACER, 2017) and the 2019 Australian Government initiative to review the AITSL standards to ensure evidence-based approaches to reading instruction are instilled in ITE programs, several questions must be addressed to identify the best pathways to support pre-service teachers. These questions include: *How prepared are ITE students to teach early reading skills?* and *How can ITE students gain the necessary knowledge and skills to become quality teachers of reading for all children?*

2.2 How Prepared are ITE Students to Teach Early Reading Skills?

2.2.1 **Content of initial teacher education programs.** ITE programs are required to ensure pre-service teachers have a range of knowledge and skills to teach across multiple learning areas and year levels of the Australian Curriculum. However, teaching children to read is a significant role of junior primary teachers (McNeill & Kirk, 2014; Walsh, Glaser, & Wilcox, 2006; Wilson, McNeill, & Gillon, 2015, 2016). Recent studies (König, Ligtvoet, Klemenz, & Rothland, 2017) on ITE courses have discovered that pre-service teachers have varied opportunities to acquire the necessary knowledge and skills to become skilled teachers of reading. An investigation by Buckingham and Meeks (2019) on teachers' preparation to teach reading found that only 15% of ITE courses provided specific and expert knowledge of the science of early reading instruction or literacy teaching. Of concern, the essential key pillars of reading instruction were not mentioned in 70% of ITE courses, and the SVR was not mentioned in any of the 116-unit outlines. These findings are consistent with Walsh et al.'s (2006)

earlier report stating that course syllabi across American universities and colleges tend to teach methodologies with poor scientific evidence that dismiss the learning needs of 40% of children. This lack of embracement of the scientific evidence associated with teaching children to read has been identified as directly relating to student achievement (Guerriero, 2017). Research in Australia has found that less than 10% of Australian ITE course time is devoted to teaching reading, let alone scientifically validated methods of teaching reading (Louden et al., 2000; Rowe & NITL [Australia], 2005). Further, research by Oliveira, Lopes and Spear-Swerling (2019) has highlighted the absence of assessment and intervention strategies for children with reading and writing disabilities. König et al. (2017) has proposed that if ITE programs are not preparing pre-service teachers to effectively assess and intervene in reading and writing problems, teachers will be unable to deal effectively with these problems in the classroom. Currently, new graduates from ITE courses are reportedly highly critical of the lack of rigour and limited coverage of the knowledge on how children learn to read and the most effective methods of teaching (Buckingham & Meeks, 2019).

Poor understanding of the linguistic structure of language and how it translates into its written form limits pre-service teachers' ability to teach PA and letter–sound knowledge skills explicitly and systematically to young children (Fielding-Barnsley, 2010; Moats, 2011). This is concerning given that these skills are two of the best predictors of how well young children will learn to read in the first two years of school (Carson et al., 2013; Hulme et al., 2012). Further, this limited knowledge is confounded by ideological approaches that maybe reinforced by educational scholars and communities during placement opportunities for ITE students (Clark, Helfrich, & Hatch, 2017). This includes being exposed to mentorship in whole language approaches such as the popular three-cueing system and RR, as mentioned previously. Limited

knowledge of the linguistic structure of language, especially PA and letter–sound knowledge, paired with non-evidence-based approaches to reading inevitably mean that many ITE students may be exposed to outdated and conflicting information (Clark et al., 2017). Given that the research has indicated that ITE programs may be deficient in teaching current evidence-based approaches to reading instruction for young learners (Buckingham & Meeks, 2019), it is imperative that supplementary learning methods (such as that addressed in this thesis) and wider course reviews are developed and researched for integrity.

2.2.2 **Teachers' self-reported and actual skills.** Investigation into teachers' self-reported and actual linguistic skills related to the Big Six pillars of reading success has identified an important mismatch between perceived and reported abilities that must be addressed at the pre-service teacher level (Mather et al., 2001; Stark, Snow, Eadie & Goldfeld, 2016). Carson and Bayetto's (2018) research had similar findings to those of previous studies (Cunningham, Zibulsky, & Gallahan, 2009), indicating that although many early childhood teachers (77%) and early years' primary school teachers (81%) possessed a robust *sense* of capacity to instruct and assess literacy skills, there was a mismatch between self-reported and actual knowledge. For example, in the area of PA, teachers reported having adequate to high personal linguistic skills, but on assessment, these skills were of low quality (with early childhood teachers scoring 38.36% correct in PA and early years' primary school teachers scoring 51.97% correct in PA). Further, teachers must be able to frequently respond and adapt to students as errors are made, explain concepts explicitly, provide interesting examples and give targeted feedback when errors occur (Moats, 2009a). Ensuring teachers are able to accurately understand what they do and do not know in terms of linguistic knowledge and the early teaching of reading skills is imperative and is best tackled at the pre-service teacher level.

Research conducted by Lenski et al. (2013) found that effective ITE programs that adequately prepare pre-service teachers to be skillful reading teachers prioritise evidence-based theory, instruction and knowledge of assessment. These effective ITE programs also showed pre-service teachers how to use their skills and knowledge during the course (Lenski et al., 2013).

2.2.3 **Profiling the gaps in pre- and in-service teacher knowledge.** Teachers who lack the prerequisite knowledge and skills related to reading cannot effectively implement an evidence-based reading program (Moats, 2007). This situation relates to the Peter principle (Applegate & Applegate, 2004), which proposes that a teacher cannot teach a skill that he or she does not possess (Binks-Cantrell, Washburn, Joshi, & Hougen, 2012). Studies suggest that in-service teachers have a limited understanding of the specific features of language that are critical for teaching the foundational skills of early reading (Carroll, Gillon, & McNeill, 2012; Moats & Foorman, 2003; Moats & Lyon, 1996), including an in-depth knowledge and ability to apply PA and letter–sound knowledge skills. Fielding-Barnsley and Purdie (2005) found that while teachers had positive attitudes towards code-based and meaning-based reading instruction, their metalinguistic skills were poor. For example, teachers scored only 24% when asked to count the number of phonemes in words, indicating the inability to consciously disconnect sounds from the spelling of words. Carroll et al.'s (2012) research demonstrated these gaps in language knowledge, particularly the poor PA of in-service teachers and ITE students compared with speech pathologists. Performance variation was particularly evident in response to the item *scream* in the second sound identification subtest, with 100% of speech pathologists answering correctly compared with 44% of in-service teachers and 39% of third-year ITE students (Carroll et al., 2012, p. 237). This research also found that teachers with higher levels of personal PA

knowledge are more comfortable spending adequate time explicitly teaching these skills. Further, Bos, Mather, Dickson, Podhajski and Chard (2001) found that 53% of pre-service teachers were unable to answer half of the questions on language structure such as 'What is the second sound in the word *queen*'? (p. 107).

Moats (1999) has described the teaching of reading as 'rocket science', and therefore requires teachers to be highly educated in the science of reading development and linguistics (Stark, Snow, Eadie & Goldfeld, 2016). Although experts have extensive knowledge on how to teach the mechanics of reading (Hempenstall, 2016; Moats, 2009b), more must be done to support teachers to develop linguistic knowledge as the basis for becoming skilled teachers of reading (ACER, 2017; Baumann, Hoffman, Duffy-Hester, & Moon, 2000; Honan, Exley, Kervin, Simpson, & Wells, 2013). These issues have been illuminated in developed countries such as America, England, Canada and New Zealand where English is the primary written means of communication (Washburn, Binks-Cantrell, Joshi, Martin-Chang, & Arrow, 2016), indicating that action is needed to support ITE students to become skilled teachers of reading.

2.3 How Can Initial Teacher Education Students Gain the Necessary Knowledge and Skills to Become Quality Teachers of Reading for All Children?

Evidence for building on ITE programs through specific supplementary interventions offers the unique potential for increasing teachers' knowledge and skills (Reeves & Honig, 2015). An online professional learning program designed to supplement existing course information and deepen PA and letter–sound knowledge may help ensure that all pre-service teachers are adequately prepared to teach children how to read in the early schooling years. Online learning programs provide flexibility, may be constantly updated and are adaptable to a range of devices and settings. With

evidence indicating the need to enhance ITE students' knowledge and skills of the five (or six) key pillars of reading success, this research aims to develop and evaluate a tool that provides supplementary knowledge of two of these pillars—PA and letter–sound knowledge.

2.4 Online Programs for Supplementing Initial Teacher Education

Pure online learning courses are those in which all activities are completed online, and no face-to-face sessions or on-campus activities are required (Sener, 2015). Online courses eliminate geography as a factor for students, institutions, instructors, content and peers. Online learning provides a convenience that is not available in traditional classes and has been found to be especially beneficial to students who are balancing work, family and school commitments (Kauffman, 2015).

Online learning as a mode of education continues to gain momentum across the globe. According to a report by Allen and Seaman (2017), distance education continues to grow across America, with 29.7% of higher education students participating in distance education as part of their courses (up 3.9% from the previous year), 14.3% enrolling exclusively in distance education and 15.4% enrolling in a combination of distance and non-distance courses. This report concurs with Australian findings that the majority of students choosing to study online are at the undergraduate level (Australian Education Network, n.d.). The University of New England, the Australian university with the largest percentage of online users, has reported that 75% of its undergraduate students and 88% of its postgraduate students are taking online courses as their sole mode of education (Australian Education Network, n.d.). According to Kauffman (2015), almost all courses within higher education institutions currently offer some form of online learning or web-based technology to aid in the delivery of learning.

In the context of the history of education, online learning is still in its infancy (Kauffman, 2015), and educators are still navigating the challenges of applying a new mode of learning to current instructional practices (Pike & Gore, 2018). Siemen (2005) has highlighted that new information is continually being acquired and that we need to recognise when it changes the way decisions are made. This may be applied to educational settings and calls for flexibility in how we approach education and the platforms from which we present information in the digital age. Capitalising on technology and research that has highlighted the key technical features of the online learning environment is critical when considering the development of online learning supplements to enhance the capacity of pre-service teachers, especially those in their final year, to understand and apply up-to-date evidence-based reading instruction methods in the classroom.

2.4.1 **Instructional designs ideally suited to online courses.** Studies have investigated whether a constructivist model of learning (i.e. a philosophy that encourages self-directed learning) (Cercone, 2008; Huang, 2002) can be successfully applied to online courses (Eom, Wen, & Ashill, 2006; Ruey, 2010; Song, Singleton, Hill, & Koh, 2004). Using Mason's (1998) three models of online learning (integrated, content plus support and wraparound), a framework that encompasses both comprehensive and supplementary online use, Ke and Xie (2009) examined the effect of course design on user satisfaction, concluding that an integrated model (i.e. one that was unstructured and adaptable, had no weekly textbooks readings and involved peer interactions via online discussions and team projects along with active facilitation) promoted the highest level of user satisfaction. However, the difference in satisfaction levels between the integrated model and the content plus support model (highly structured with pre-recorded lectures, assignments and quizzes and minimal interaction

with other students) was not significant. Ke and Xie's (2009) study found that deep learning and a strong sense of community were two identifiable factors in reported student satisfaction. They also concluded that adult learners performed better with the content plus support model because this encouraged the most thoughtful online interactions. Similarly, Tallent-Runnels et al. (2006) found that well-structured content was the top priority for online learning. Although somewhat contradictory, these results show that to increase user satisfaction and encourage deep engagement with online content, a balance between the integrated model and the content plus support model should be considered in designing an online program. This was critical in the design of the online supplementary program presented in this thesis.

2.4.2 **Features underpinning high-quality online content.** Research has identified the characteristics of online resources that are most valued by users of online content (McGill & McLeod, 2019). Parents accessing a website to support active waiting for speech-language pathology services reported that high-quality information, printable resources and evidence-based, trustworthy handouts were important characteristics when selecting online platforms to increase knowledge of language-based conditions. Further, participants mentioned that strategies for practising and accessing further information were beneficial. The top ten features and functions related to accessing online content (McGill & McLeod, 2019), which directly informed the survey tool within this master's study, were as follows:

- obvious navigation and icons;
- simple language, wording and terminology;
- practical activities;
- simple text and font;
- printable resources;

- searching tool;
- videos and animations;
- links to other websites;
- responsiveness;
- sources of evidence and references.

These characteristics, along with those found in Ke and Xie's (2009) study on instructional design (i.e. integrated and content plus support), provided the foundation for the design of the online supplement program presented in this thesis.

2.4.3 **Frameworks for constructing and appraising an online program.** With the introduction of new technologies in teaching, Koehler and Mishra (Koehler et al., 2013) have added the technological domain to Shulman's (1986) framework of knowledge growth in teaching referred to as pedagogical content knowledge. Shulman (1986) proposed that the integration of knowledge on pedagogy (how to teach) and content (what to teach) was essential to transform the subject matter of teaching. Pedagogical knowledge is the knowledge of educational purposes and aims, how students learn and general classroom management (Koehler et al., 2013). Content knowledge is the knowledge of theories, concepts and evidence and established practices and strategies for acquiring knowledge (Shulman, 1986). Koehler and Mishra's new framework (Koehler et al., 2013)—technological pedagogical content knowledge (TPACK)—enables the integration of technology with traditional models of teaching knowledge (i.e. pedagogy and content knowledge) to meet the needs of the current learning climate (see Figure 2.1). Technological knowledge includes an understanding of how technology assists or impedes learning and the ability to adapt to changes in information technology. Technological knowledge was an important

consideration in the design and refinement of the supplementary program presented in this thesis.

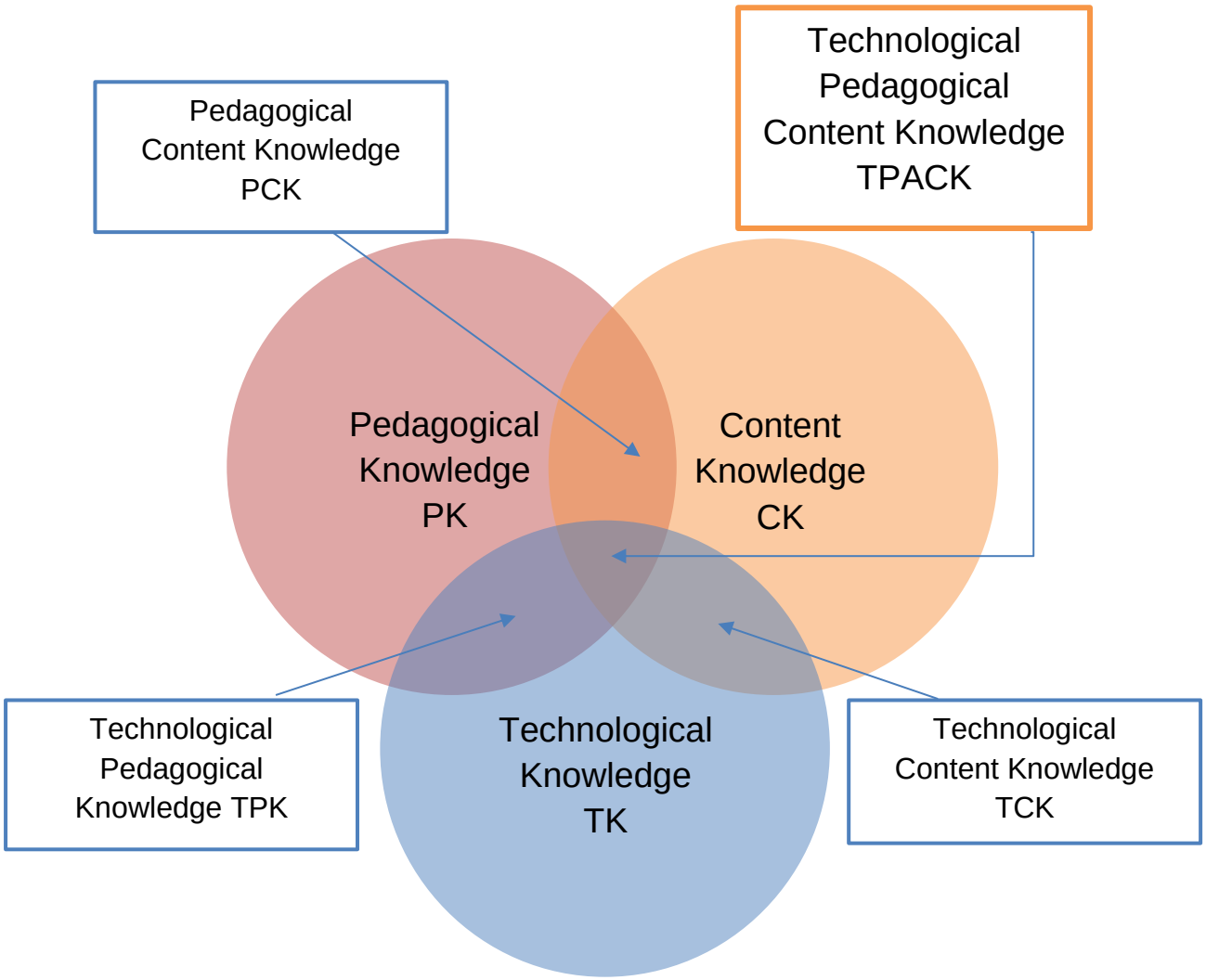

Figure 2.1. Technological pedagogical content knowledge (TPACK). Adapted from 'What is Technological Pedagogical Content Knowledge (TPACK)?, by M. Koehler, P., Mishra and W. Cain, 2013, *Journal of Education, 193*(3), 13-19.

In addition to using TPACK as a framework for constructing and appraising an online program, Brandt's (1998) principles of powerful learning (PPL) may be employed to provide optimal conditions for learning. Brandt's principles include how students learn (e.g. whether they learn in their own way, have choices and feel in control), where students learn (e.g. whether they experience a positive emotional climate) and what students learn (e.g. whether what they learn is appropriate for their developmental level) (see Figure 2.2 for full details).

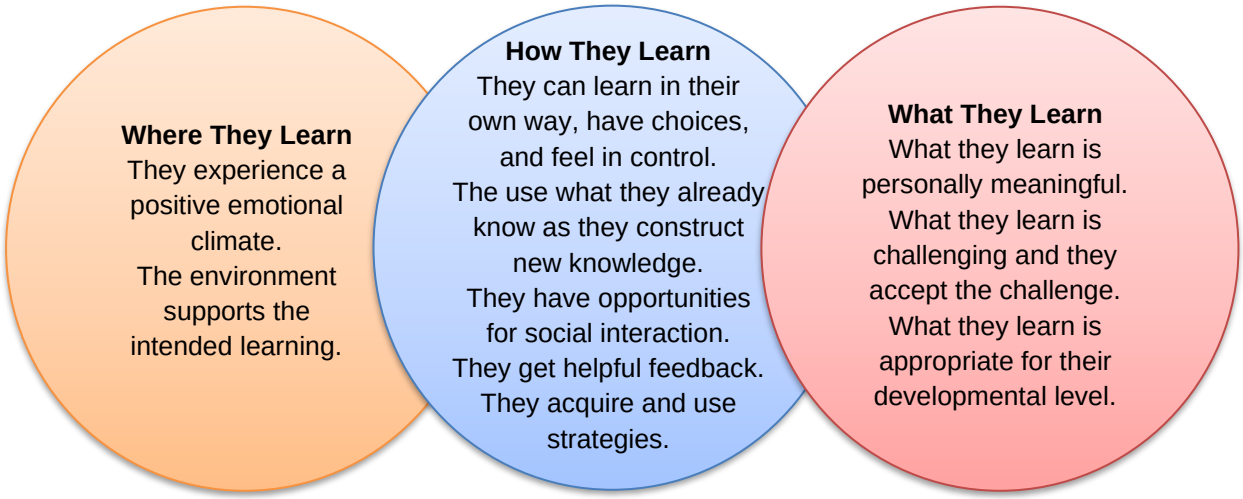

Figure 2.2. Principles of powerful learning (PPL). Adapted from 'Powerful learning', by R. Brandt, 1998. Retrieved from https://ebookcentral-proquest-com.ezproxy.flinders.edu.au

As tools or frameworks to appraise online programs, Mishra and Koehler's TPACK (Koehler et al., 2013) and Brandt's (1998) PPL are complemented by a growing body of research evidence (e.g. Lynch & Horton, 2016; McGill & McLeod, 2019). This evidence may be collated to provide critical information about the appropriateness of *content*, *appearance*, *usability* and *credibility* of online programs to

inform their refinement and future use. These four features were the focus of evaluation of the online supplementary program developed in this master's project:

- Content: As discussed above, the content of online learning platforms is critical for successful learning outcomes (Koehler et al., 2013). The quality of content of online learning materials may be evaluated by measuring the appropriateness of content quantity, the quality of practical activities, the value of printable resources, the use of linguistic activities to increase pre-service teacher knowledge, the use of video information to demonstrate the translation of new knowledge into class-based settings and the use of case studies to enable the application of new linguistic knowledge and evidence-based teaching strategies. Importantly, these quality of content features were used to inform the design of the survey tool using in the third stage of the method (see Chapter 3).
- Appearance: In line with TPACK and PPL, Lynch and Horton (2016) and Rosenfeld, Morville and Arango (2015) have highlighted the importance of appearance of online materials, which may be evaluated in terms of balance between reading and viewing to avoid the impression of clutter and the use of diagrams and tables to present information in multiple modes. Similarly, these appearance features also informed the survey tool used in the third stage of the method (see Chapter 3).
- Usability: According to various authors (Hahnel, Goldhammer, Naumann, & Kröhne, 2016; Lynch & Horton, 2016; Nielson, 2012), usability reflects the quality of consumer experience and may be measured by the pace of information presentation, the ease of navigation and accessibility of icons, the use of simple language, wording and terminology and embedded discussion opportunities for

user interaction. These usability features were included in the survey tool (see Chapter 3).

- Credibility: In line with TPACK and PPL, research (e.g. McGill & McLeod, 2019; Wierzbicki, 2018) has demonstrated that the integrity of online learning materials should be evaluated with respect to the identifiability of authors, the trustworthiness of sources of evidence and the quality of links to other websites. These credibility features also informed the design of the survey tool (see Chapter 3).

2.5 Summary

Given the scope to improve ITE students' readiness to teach the key pillars of reading success, the benefits of online supplementary learning and the recent Australian Government initiative to ensure new graduates are prepared adequately to teach reading, the development of an online supplementary program (based on TPACK and PPL) for final-year ITE students may be one way to support national priorities focused on increasing the reading achievement of Australian children. To this end, this project investigated the following research question:

To what extent do experts, in-service teachers and pre-service teachers agree on the appropriateness of an online program's content, appearance, usability and credibility to increase final-year ITE students' understanding of phoneme awareness and letter–sound knowledge as important aspects of teaching children how to read?

Chapter 3: Methods

3.1 Introduction

A mixed methods research design (Creswell, 2014) comprising three stages was used to design and pilot an online evidence-based supplementary professional learning program for final-year ITE students. The mixed method research design was chosen due to the research requiring both qualitative and quantitative data to be collected to gain a more insightful understanding of the participants' perspectives by allowing the participants to elaborate on their position. The three key stages in the method were (1) sourcing appropriate content, (2) construction of the online supplementary program covering eight essential modules and (3) collation of multidisciplinary and end user feedback pertaining to the quality of content, appearance, usability and credibility of the supplementary program.

3.2 Stage 1: Sourcing Appropriate Content

3.2.1 **Search process for identifying appropriate content.** Appropriate content was found by searching the Scimago Journal and Country Rank (Scimago Lab, 2019) website to identify reputable quartile 1 (Q1) journals focused on the subject areas of psychology, specifically developmental and educational psychology, and social sciences, specifically linguistics, language and education. Identified journals included the *Review of Educational Research*, *Journal of Educational Psychology*, *Journal of Teacher Education* and *Reading Research Quarterly* (see Appendix A). Keywords and phrases were used to search for content in these journals that would be considered appropriate for the online program. Keywords and phrases included but were not limited to *pre-service teacher/literacy skills*, *pre-service teacher/self-efficacy*, *phonological*

awareness, *letter–sound knowledge*, *phonics instruction/assessment* and *evidence-based reading instruction* (see Appendix B).

Using the keywords and literature from the search of identified Q1 journals in the field, a subsequent search using Google Chrome was employed. This was to ensure that research datasets, reports and policies mentioned in high-quality peer-reviewed research studies were captured. This search involved locating key international documents such as the *Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis* (Ehri et al., 2001) and current and longitudinal data from PIRLS (Mullis, Martin, Foy, & Hooper, 2017), PISA (OECD, 2004, 2005, 2015) and the *Independent Review into the Teaching of Early Reading: Final Report* (Rose, 2006) (see Appendix C). National documents and resources included the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA] 2008), the *National Inquiry into the Teaching of Literacy* (Department of Education, Science and Training, 2005) and *Prepared to Teach: An Investigation into the Preparation of Teachers to Teach Literacy and Numeracy* (Louden et al., 2005) (see Appendix D). Among other governmental policy and guidelines, the *Australian Professional Standards for Teachers* (AITSL, 2011) was identified as key to mapping the supplementary online program to ITE course expectations. To meet the graduate professional standards for teachers, students enrolled in ITE courses are expected to critically analyse and document in a portfolio the evidence of their learning and performance across course topics and professional experiences. In line with the *Australian Professional Standards for Teachers*, the online supplementary program designed in this thesis directly links the learning goals with the three domains of teaching: professional knowledge, professional practice and professional engagement. For example, Modules 1, 2 and 4 align with AITSL's

‘Professional Knowledge Standard 2: Know the content and how to teach it’. ‘Standard 2.1: Content and teaching strategies of the teaching area’ includes being able to demonstrate knowledge and understanding of concepts, substance and structure of the content and teaching strategies of the teaching area (see Appendix E).

As well as the AITSL standards, the program is also aligned with the Australian Curriculum (ACARA, 2008). For example, Module 2 aligns with ‘English: Sequence Of content F-6 Strand: Language’ in which children are to be exposed to ‘phonological and phonemic awareness of the ability to identify the discrete sounds in speech (phonemes), and to reproduce and manipulate them orally’ (ACARA, 2008) (see Appendix F). The International Dyslexia Association’s (IDA, 2018) *Knowledge and Practice Standards for Teachers of Reading* was identified as being significant to this program and was mapped against the modules. For example, Modules 1 and 5 align with ‘Standard 1: Foundations for literacy acquisition’. Standard 1.4 requires teachers to ‘identify and explain aspects of cognition and behaviour that affect reading and writing development: Cite examples of tasks or tests that measure each general cognitive factor; explain how problems in these areas might be observed in classroom learning’ (IDA, 2018) (see Appendix G). Suggestions for further readings were sourced from specific organisations such as the Specific Learning Difficulties Association of South Australia because these had a direct correlation with the core content provided in the modules.

Further, key authors were identified by searching for keynote speakers and eminent professors of international conferences, providing insights into studies on reading. Organisations such as the Speech Pathology Australia and Learning Difficulties Australia and conferences such as the South Australian Department for Education’s Literacy Summit provided insights into key authors. Relevant key authors identified in the field of reading development and its disorders included

- Louisa Moats: instructional policy and practice;
- Pamela Snow: teachers' self-rated ability and social equity;
- Jane Carroll, Gail Gillon and Brigid McNeill: phonological awareness and knowledge of educational professionals;
- Margaret Snowling: dyslexia;
- Kerry Hempenstall: instructional policy and assessment;
- Linnea Ehri: instructional practice;
- Maryanne Wolf: neuroscience of reading;
- Jennifer Buckingham: educational policy;
- Anne Bayetto: classroom-based implementation;
- Marilyn Cochran-Smith: teacher education research, practice and policy;
- Anne Castles: cognitive science of reading;
- Max Colheart: cognitive psychology.

3.2.2 **Analysing and critically reviewing sources identified.** While the construction of the online site is discussed in Stage 2, it is important to highlight that content was analysed in terms of appropriateness and its relationship to several pedagogical strategies used to support high-quality online teaching and learning, namely TPACK (Koehler et al., 2013) and PPL (Brandt, 1998). All content was analysed and selected based on its ability to support the following: a) the teaching of linguistic skills that are important for early reading instruction so that pre-service teachers are not subject to the Peter principle (i.e. teachers cannot teach what they do not understand); b) demonstration of high-quality instruction to support the transformation of theory into classroom practice; c) provision of an overview of key research by experts addressing fundamental components of reading development at the word level; d) identification of myths that have remained part of the dialogue about learning to read and may cause

confusion for pre-service and in-service teachers, parents and caregivers; e) linking of content to the Australian professional teaching standards and f) suggestions for further exploration in the form of websites, visual clips and policy documents. Content was then assigned to eight key modules. There were: **Module 1**: *Foundations of Literacy Acquisition – The big picture*, **Module 2**: *Phonological Awareness*, **Module 3**: *Structured Literacy Instruction*, **Module 4**: *Phonics*, **Module 5**: *Knowledge of Diverse Reading Profiles*, **Module 6**: *Assessment*, **Module 7**: *More on Assessment*, **Module 8**: *Joining the Dots* (see Figure 3.1). Please log in to the online program to view each module's content as well as construction as detailed in stage two below (URL: https://neum0025.moodlecloud.com/login/index.php; username: neum0025; password: neum8405).

3.3 Stage 2: Construction of the Online Supplementary Program

As described in Chapter 2, an online course can be constructed and appraised in several ways. In the current project, the TPACK (see Figure 2.1) framework (Koehler et al., 2013) was used to guide the construction of the online supplementary program to evaluate the initial and specific areas of research interest. These included *content* (Koehler et al. 2013), *appearance* (Australian Commission on Safety and Quality in Health Care, 2017; Koehler et al, 2013; Lynch & Horton, 2016; Rosenfeld et al., 2015), *usability* (Koehler et al., 2013; Lynch & Horton, 2016) and *credibility* (Koehler & Mishra, 2009; McGill & McLeod, 2019) of the online supplementary program. In addition, Brandt's (1998) PPL was used to underpin the construction of this supplementary program, with a particular emphasis on conditions for powerful learning. The following section describes the construction of the online course.

3.3.1 **Construction to ensure high-quality content that promotes learning.**

Central to Koehler and Mishra's (Koehler et al., 2013) extension of Shulman's (1986)

pedagogical content knowledge is the notion of the teacher transforming the subject matter by tailoring instructional materials to suit students' prior knowledge and the flexibility of exploring alternative ways of looking at the same idea. Features of the supplementary online program to ensure high-quality content and address these two points specifically include the following:

- a summary of prior modules and student knowledge delivered by audio introductions at the start of each module and conclusions at the end of each module;
- high-quality visual examples of reading experts discussing key concepts such as the Big Six of reading development (see Chapter 1);
- quizzes to support the development of new linguistic skills taught to participants (i.e. PA skills such as phoneme identity, counting, segmentation, blending and manipulation as profiled in Figure 1.1 and discussed in Chapter 1);
- inclusion of 'myth buster' quizzes to evaluate the uptake of new learning and the ability to compare evidence-based with pseudoscientific methods that plague reading instruction in classrooms (i.e. whole language instruction, three-cueing system and RR—see Chapter 2);
- printable resources that support quick access to key information and flow charts to support classroom assessment and instructional practices;
- case studies to support the translation of new or deepened knowledge into stimulated class-based contexts.

The use of these features to ensure that content promotes learning is also aligned with the PPL (see Chapter 2 and Figure 2.2), in particularly ensuring that students

- have information available in multiple ways so that they can learn in their own way;

- have choices and feel in control;
- are supported (e.g. audio introductions and conclusions and reviewing of module content) by what they already know as they construct new knowledge.

3.3.2 **Construction to ensure high-quality appearance.** As described by Koehler and Mishra (Koehler et al., 2013), technological content knowledge (see Chapter 2 and Figure 2.1) is the knowledge that content and technology both influence and limit one another. Teachers must have an understanding of the technologies that are best suited to addressing specific subject matter and how content can limit technology and vice versa (Koehler et al., 2013). The inclusion of features to ensure high-quality appearance of the program was to balance reading and viewing by

- breaking up large amounts of text by embedding alternative ways of accessing information (e.g. key information presented by an expert via a visual clip and visual demonstrations of in-class practice of linguistic skills instruction);
- providing links to access further information rather than overloading the user with all information on one level (e.g. links to tables and diagrams and hyperlinks to extended reading opportunities).

The use of these features to ensure a high-quality appearance also aligned with the PPL (see Chapter 2 and Figure 2.2), in particular ensuring that

- students can learn in their own way, have choices and feel in control;
- students use what they already know as they construct new knowledge;
- students acquire and use strategies;
- students experience a positive emotional climate;
- the environment supports the intended learning.

3.3.3 **Construction to ensure high-quality usability.** Technological pedagogical knowledge (see Chapter 2 and Figure 2.1) refers to the pedagogical

constraints and affordances of technology as it relates to pedagogical design and strategies (Koehler et al., 2013). Features that reflect these understandings and ensure high-quality usability include the following:

- flexible pace in which users can access topics as desired;
- choice of level of engagement (e.g. access to original articles for deep engagement or summaries for shallower engagement);
- clear navigation tools (e.g. a menu bar and divided modules) to make information easily accessible;
- consistent layout and use of the same template to create modules (e.g. all modules begin with an audio introduction and then move to learning about a new linguistic skill);
- accurate labelling of links;
- simple language, wording and terminology (complex terminology is also presented in a simple/lay version and a glossary for terms and definitions that are frequently used in relation to literacy development);
- use of visual clips to demonstrate instructional strategies and provide further expert knowledge on key topics;
- opportunities for users to network ideas and knowledge with other learners and share materials or resources via discussion.

The use of these features to ensure high-quality usability was also aligned with the PPL (see Chapter 2 and Figure 2.2), in particular ensuring that

- students can learn in their own way, have choices and feel in control;
- students use what they already know as they construct new knowledge;
- students have opportunities for social interaction;
- students acquire and use strategies;

- students experience a positive emotional climate;
- the environment supports the intended learning.

3.3.4 **Construction to ensure credibility of content.** As defined by Koehler and Mishra (Koehler et al., 2013), content knowledge (see Chapter 2 and Figure 2.1) pertains to the evidence and established theories, practices, ideas and organisational frameworks that are understood by teachers and covered in the content. Stage 1 of the method ensured that authors and sources were credible. Users of the online program should be able to authenticate that the information provided is credible and evidence-based by ensuring that

- all authors have been referenced;
- all publications have been referenced;
- there are links to credible websites that concur with the information provided in the modules;
- professional links are available to connect content directly to the necessary skills and knowledge of graduate teachers and highly skilled teachers of reading (e.g. AITSL's *Australian Professional Standards for Teachers* [see Appendix E]; Australian Curriculum [see Appendix F] and International Dyslexia Association *Knowledge and Practice Standards for Teachers of Reading* [see Appendix G]).

The use of these features to ensure high-quality content also aligned with the PPL (see Chapter 2 and Figure 2.2), in particular ensuring that

- the environment supports the intended learning;
- what students learn is appropriate for their developmental level.

Figure 3.1 provides an overview of the eight modules with reference to features that underpin high quality content, appearance, usability and credibility for online material.

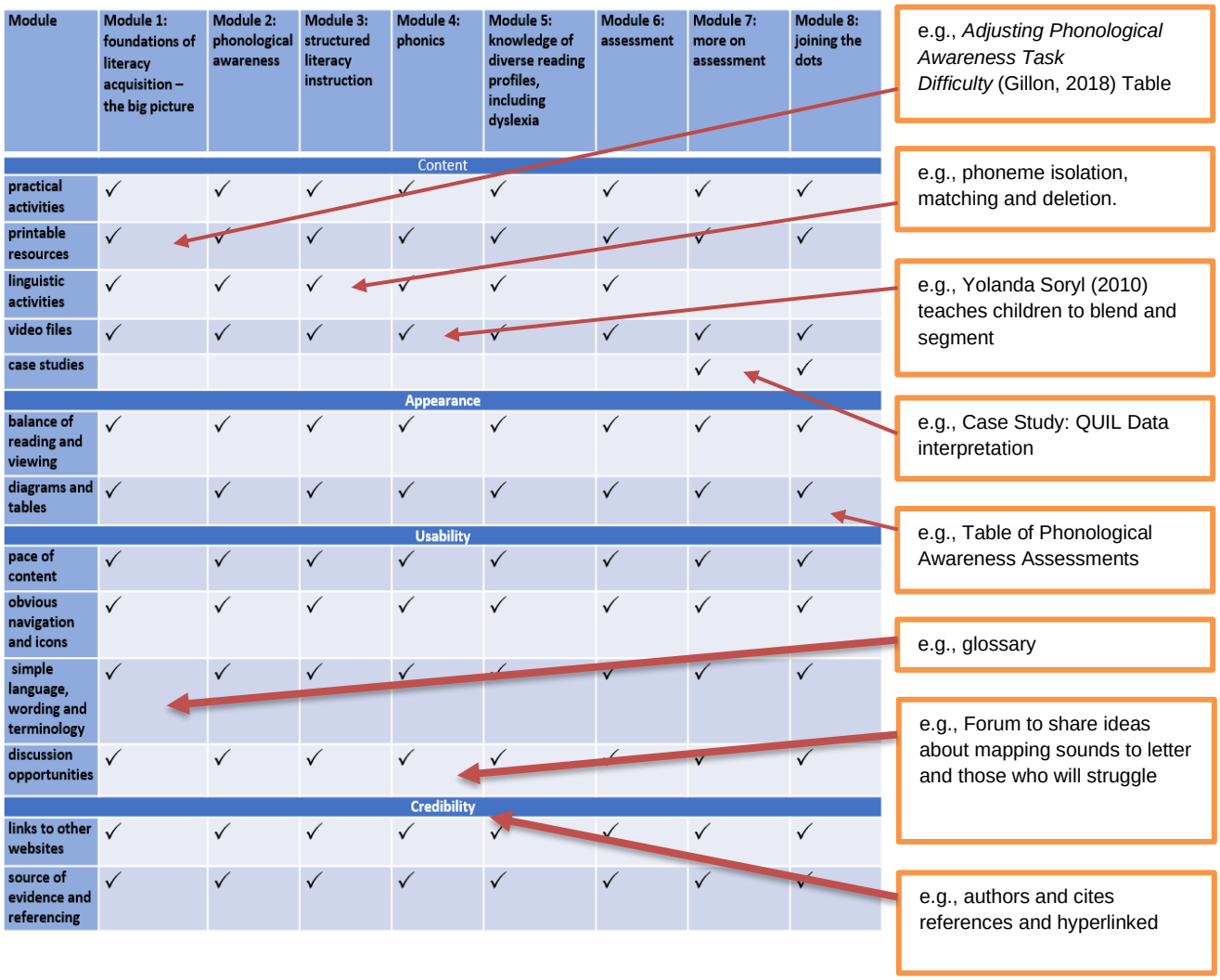

Figure 3.1. Module content, appearance, usability and credibility.

3.4 Stage 3: Multidisciplinary and User Feedback

Stage 3 of this project involved the creation of a survey tool to collect qualitative and quantitative feedback from a sample of experts (academics, psychologists and speech and language pathologists), in-service teachers and intended target users (i.e. pre-service teachers) regarding the content, appearance, usability and credibility of the online supplementary program. The following sections provide details of this process.

3.4.1 **Procedure and participants.** The target participants for this pilot study were individuals who had current evidence-based professional knowledge of the science of reading instruction (see Chapter 1), who had the capacity to provide an understanding or support the program development or who belonged to the target user group. It was intended that target participants would (1) provide useful information for course development, (2) contribute further knowledge in their field of expertise and (3) provide user perspective (Creswell, 2014).

The target pilot sample was a non-random convenience sample of five participants from each of the following fields: speech and language pathology, psychology, educational academic, in-service teachers and pre-service teachers. These five disciplines were selected because each was recognised as offering valuable skills and knowledge in reading development. Speech-language pathologists, psychologists and academics represented the expert cohort and in-service teachers represented the current bridge from theory to practice. Pre-service teachers were the intended target user group and represented the potential of enhancing literacy instruction and assessment in the multidisciplinary field of mainstream classroom teaching in the future.

The sample for this study comprised individuals in South Australia who met at least one of the following criteria:

- fully certified with Speech Pathology Australia as a practising member;
- member of the Australian Psychological Society;
- education academic with a history of teaching and research in reading development, assessment and instruction, special education or English at a South Australian university;
- registered in-service teacher with the South Australian Department for Education;

- final-year ITE student at Flinders University.

Speech-language pathologists and psychologists in South Australia were identified using a Google search. After gaining permission from the Dean of Research (see Appendix H), education academics at Flinders University were identified via teaching and research allocations for staff, while final-year ITE students were invited to participate via core ITE topics.

Initial email contact was made with 14 speech and language pathologists, 11 educational psychologists, five Flinders University academics, eight in-service teachers with a specific interest in early reading skills, 11 Department for Education primary schools and 12 pre-service teachers. The intention was to continue contacting potential participants until the target sample size was met, however this was limited to the time constraints of this research. The initial email included a brief invitation to participate (see Appendix I), a letter of introduction (see Appendix J), an information sheet (see Appendix K), a consent form (see Appendix L) and ethical approval (see Appendix M). Participants who returned the consent form (n = 10) were emailed details of how to access the online program and the survey sheet as a printable Word document (see Appendix N). Reviewing the online program and completing the survey was expected to take approximately 45 minutes. Figure 3.2 illustrates the number of people contacted, the number who declined the offer to participate, the number who did not respond to the invitation and the number who participated.

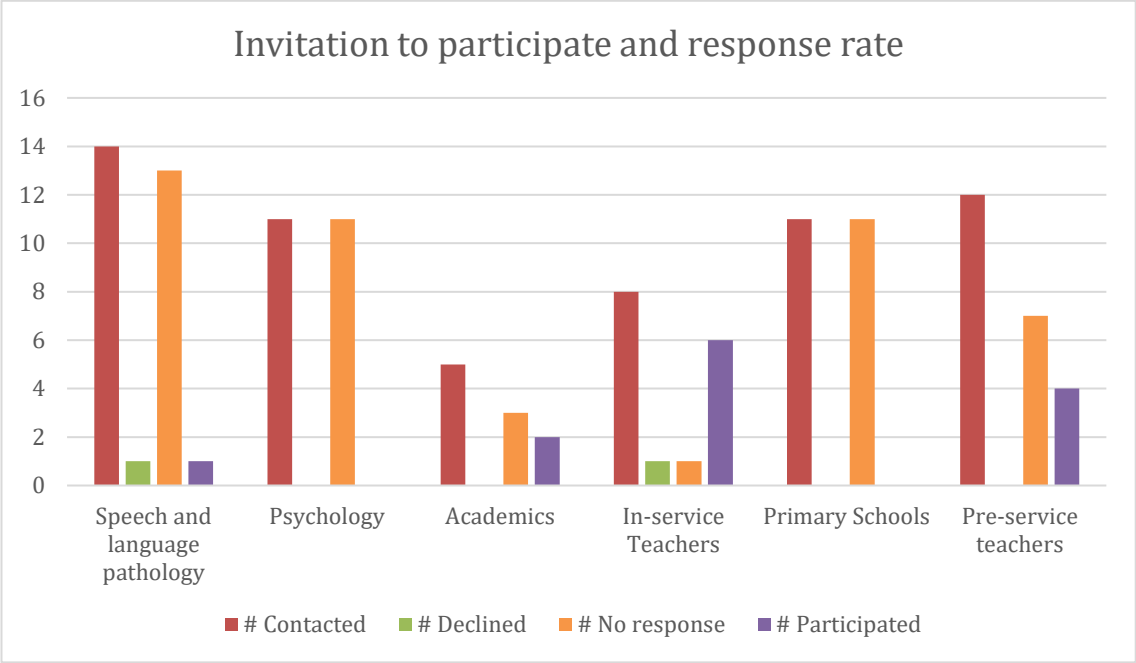

Figure 3.2. Invitation to participate and response rate.

From the 25 surveys distributed, the response rate was 40% (n = 10). A sample of ten was viewed as sufficient for an initial pilot study due to the constraints of a master's project. Participants from the five disciplines who answered the survey and consented for their results to be analysed and published included ten adults (two males and eight females). The ten participants included a speech-language pathologist, two education academics, five in-service primary school teachers and two pre-service teachers in their final year of an ITE degree. No psychologists participated in the survey. Academics represented more than 30 years of educational research, while in-service teachers represented over 50 years of classroom teaching.

3.4.2 **Survey instrument.** A survey tool (see Appendix O) was developed to obtain a range of perspectives on content, appearance, usability and credibility of the online program, with space provided for further comments. The survey questions were

based on the PPL (Brandt, 1998) and TPACK (Koeher et al., 2013) with reference to studies on credibility (McGill & McLeod, 2019; Wierzbicki, 2018), appearance (Lynch & Horton, 2016; Rosenfeld et al., 2015) and usability (Lynch & Horton, 2016; Nielson, 2012) to ensure that the quality of the online course could be measured and refined for future ITE students.

The survey consisted of two parts: Part 1 comprised 14 questions linked to four overarching themes: (1) content (six questions); (2) appearance (two questions); (3) usability (four questions) and (4) credibility (two questions). These questions were designed to collect quantitative data about the appropriateness of the above themes using a 5-point Likert scale (1 = certainly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = certainly agree). Each question included space for additional and specific comments to collect qualitative data. For example, participants were asked to rate the appropriateness of content, appearance, usability and credibility by selecting one of the five Likert scale options for:

- quantity of content;
- pace of content;
- balance of reading and viewing;
- obvious navigation and icons;
- simple language, wording and terminology;
- practical activities;
- printable resources;
- links to other websites;
- sources of evidence and references;
- linguistic activities;
- video files (e.g. expert advice, instruction samples, personal anecdotes);

- diagrams and tables;
- case studies;
- discussion opportunities.

Part 2 consisted of one question, which allowed participants to add additional comments on their perception of the online program and any recommendations for refinement.

3.4.3 **Method of data analysis.** Given the small sample of ten participants, statistical analysis in the form of quantitative descriptive statistics (i.e. frequency of responses and percentage of agreements with Likert scale options) was selected. Thematic analysis of the qualitative data collected from survey comments for each of the 14 questions as well as the general comments from Part 2 of the survey was also undertaken. Given that there were only ten participants and not all participants provided comments for each question, formal analysis using NVivo or similar was not undertaken. Rather, the supervisory team and the researcher reviewed participants' comments and categorised them based on themes, common and contrasting perspectives and advice for refinement of the online program.

Chapter 4: Results

4.1 Introduction

Quantitative (i.e. descriptive statistics from Likert Scale questions) and qualitative (i.e. themes from survey comments) data were analysed from the survey tool in order to profile and describe feedback from participants regarding the *content, appearance, usability* and *credibility* of the online supplementary program designed for use with final-year pre-service teachers in the future. Results for each of these key areas (i.e. content, appearance, usability and credibility) are described below.

4.2 Content of the Online Supplementary Program

The first phase of the method involved the sourcing of appropriate content to include in the online supplementary program. This first phase directly linked to the first part of the research question, *To what extent do experts, in-service teachers and pre-service teachers agree on the appropriateness of an online program's content, …… to increase final-year ITE students' understanding of phoneme awareness and letter–sound knowledge as important aspects of teaching children how to read?* To evaluate the quality of content in the online program, participants were asked to rate and comment on six key areas: 1) quantity of content, 2) practical activities, 3) printable resources, 4) linguistic activities, 5) video files, and 6) case studies. Survey results for each of these areas are detailed below. This is followed by Figure 4.1 which profiles overall results for these six survey questions.

4.2.1 **Quantity of content.** On a Likert scale from 1 to 5, where 1 represents 'certainly disagree' and 5 represents 'certainly agree', participants were asked to rate the quantity of the content. Of the 10 participants, five 'certainly agreed' (1x pre-service, 1 x in-service, 2 x academic, 1 x SLP), four 'agreed' (3 x in-service teachers, 1

x pre-service teacher) and one marked between ‘disagreed’ and ‘neutral’ (1x in-service). Overall, 90% of participants ‘agreed’ to ‘certainly agreed’ that the quantity of the content on the online program was appropriate. In terms of qualitative comments, two participants mentioned that there was a lot of reading and that at first it was overwhelming; however, one participant noted that they were glad the content was so detailed (1 x pre-service) whilst another thought this could lead to students ‘scanning and missing key points’ (1 x in-service). One participant suggested that there could be “2 sections e.g. ‘core’ and ‘further information” (1 x academic) as a method of allowing students to select how much content they engaged with at one time. Two academics’ comments were opposing in that one commented that the content was reasonable whilst the other felt it was far too extensive, although this did not reflect in their Likert scale selections. For example, three experts selected ‘certainly agree’ whilst in-service teachers were split between ‘neutral’ (n = 1), ‘agree’ (n = 3) and ‘certainly agree’ (n = 1), and pre-service teachers between ‘certainly agree’ (n = 1) and ‘agree’ (n = 1). Although largely positive, these results suggest that ongoing refinement regarding quantity of content that best meets end-user needs is required.

4.2.2 **Practical activities.** Using the same Likert scale described above (i.e. 1 represents ‘certainly disagree’ and 5 represents ‘certainly agree’), participants were asked to rate the appropriateness of the practical activities within the online program. Five participants ‘certainly agreed’ (1 x pre-service, 3 x in-service, 1 x academic), three ‘agreed’ (1 x pre-service, 1 x in-service, 1 x academic), and two were ‘neutral’ (1 x in-service, 1 x SLP). Overall, 80% of participants ‘agreed’ to ‘certainly agreed’ that the practical activities within the online program were appropriate for final-year ITE students. With regards to qualitative comments, participants generally noted that they enjoyed the practical activities. One in-service teacher mentioned they would

like more explicit opportunities to be creative with their learning, but did not elaborate further. Another in-service teacher noted they would appreciate more examples of how to implement effective PA and letter-sound knowledge instruction within classroom activities. It was mentioned that the placement of the linguistic quiz was prior to learning yet this participant (1 x in-service) was able to learn from their mistakes and found the feedback helpful. One pre-service participant would have liked more questions added to each quiz. Experts were divided between 'neutral' (*n* = 1), 'agreed' (*n* = 1), and 'certainly agreed' (*n* = 1); as were in-service teaching staff between 'neutral' (*n* = 1), 'agree' (*n* = 1) and 'certainly agree' (*n* = 3); whilst pre-service teachers favoured 'agree' (*n* = 1), and 'certainly agreed' (*n* = 1). This suggests that the program would benefit from further practical activities that link theory into classroom practice.

4.2.3 **Printable resources.** Participants were asked to rate the printable resources in terms of appropriateness. Five participants 'certainly agreed' (1 x pre-service, 2 x in-service, 2 x academics), three 'agreed' (1 x pre-service, 2 x in-service), one was 'neutral' (1 x SLP), and one 'disagreed' (1 x in-service). Overall, 80% of participants 'agreed' to 'certainly agreed' that the printable resources within the online program were appropriate. Qualitatively, the majority of participants (*n* = 5) who commented (*n* = 8) responded positively to the printable resources with comments such as "great resources" (1 x in-service), "easy to access" (1 x in-service) and "useful as they can help teachers to identify gaps in student learning" (1 x academic). One pre-service participant noted that "It is beyond helpful for a pre-service teacher who doesn't necessarily know where to look for high-quality resources." Further, participants offered suggestions for refinement of the printable resources including providing a clear list of all the English phonemes (1 x in-service), a separate tab that included all printable resources, and make the printable material more prominent (1 x in-service). Both

participating academics ‘certainly agreed’ whilst the SLP was ‘neutral’ due to not having attempted to print any resources. One in-service teacher ‘disagreed’ whilst the remaining were split between ‘agree’ (*n* = 2) and ‘certainly agree’ (*n* = 2). Pre-service teachers were divided between ‘agree’ (*n* = 1) and ‘certainly agree’ (*n* = 1). This suggests that the program may benefit from further printable resources that link theory into classroom practice based on in-service teacher and the SLP responses (i.e. individuals directly working in the field).

4.2.4 **Linguistic activities.** Participants also rated the appropriateness of the linguistic activities within each of the eight modules. Seven participants ‘certainly agreed’ (2 x pre-service, 3 x in-service, 2 x academics), one ‘agreed’ (1 x in-service,), and two were ‘neutral’ (1 x in-service, 1 x SLP). Overall 80% of participants ‘agreed’ to ‘certainly agreed’ that the linguistic activities within the online program were appropriate. Qualitative comments were generally positive (*n* = 6) about the inclusion of the linguistic activities; however, many participants noted problems within the activity tool itself. For example, one in-service participant noted that they foresaw a need for users to discuss and receive feedback on the activities to develop creativity in using these skills and that “doing” was only one part of learning. This participant wanted users to have the opportunity to compare, contrast, and change their understandings via connecting with other users in a creative manner. Academics selected ‘certainly agree’ (*n* = 2) whilst the SLP was ‘neutral’ commenting that they “couldn’t trial” the activities. This may be due to the participants accessing the program via the administration log-in which presented some navigational difficulties when attempting the activities. Pre-service teachers ‘certainly agreed’ (*n* = 2), while the in-service teachers ranged from ‘certainly agree’ (*n* = 3), to ‘agree’ (*n* = 1), to ‘neutral’ (*n* = 1). This suggests that the program would benefit from refining of the way the linguistic activities are managed

from a technical point of view as well as a learner point of view whereby interaction with fellow students and tutor are encouraged - a feature that will be addressed in future trials with this program.

4.2.5 **Video files.** Video files were also included in the online program to demonstrate key concepts and to illustrate how PA and letter-sound knowledge could be implemented in an early year classroom. Participants were also asked to rate the appropriateness of the video files selected for the online program. Six participants 'certainly agreed' (2 x pre-service, 2 x in-service, 2 x academics), three 'agreed' (2 x in-service, 1 x SLP), and one was 'neutral' (1 x in-service). In total, 90% of participants 'agreed' to 'certainly agreed' that the video files within the online program were appropriate. Qualitatively, there was a general theme that participants enjoyed connecting the theory to practice via the video files. One in-service teacher noted that some files were too long and skipped some, whilst six of the eight comments referred to the benefit of seeing the practical applications. One academic noted that the video files would make it easier to understand and reduce cognitive load by giving worked examples. Both academics and pre-service teachers selected 'certainly agree.' The SLP selected 'agree' while the in-service teachers were split between 'certainly agree' (n = 2), 'agree' (n = 2) and 'neutral' (n = 1).

4.2.6 **Case studies.** Finally, in terms of content, participants were asked to rate the appropriateness of case studies included in the online program. Two participants 'certainly agreed' (1 x in-service, 1 x academic), two 'agreed' (2 x pre-service), three were 'neutral' (1 in-service, 1 x academic, 1 x SLP), and three provided no response (3 x in-service). Of significance, only 40% of participants 'agreed' to 'certainly agreed' that the case studies within the online program were adequate. Five participant's comments reflected positivity toward the inclusion of case studies as a means for

deepening user understanding with two participants suggesting the inclusion of more case studies would facilitate student learning. One academic suggested that clarifying the learning intentions of the case studies would support user understanding. One academic and the SLP were 'neutral' whilst both pre-service teachers selected 'agree.' The two in-service teachers were split in their selection, one 'neutral' and the other 'certainly agreeing'. This suggests that the program would benefit from further use and refinement of case studies to connect the theory to teaching practice in a concrete way.

Figure 4.1 below illustrates overall levels of agreement for each of the aforementioned six sub-areas that, as a composite, formulate an evaluation of the overall level of agreement for quality of content within the online supplementary program.

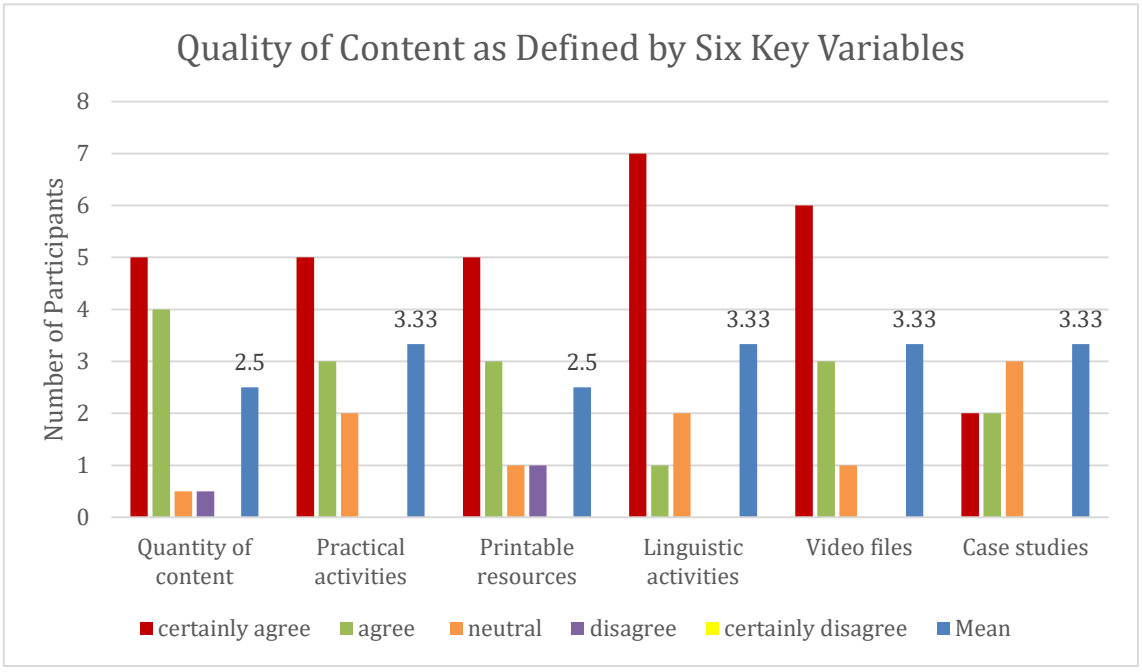

Figure 4.1. Participant agreement level for variables evaluating quality of content.

4.3 Appearance of the Online Supplementary Program

As per the study research question, appearance of the online supplementary program was evaluated. Experts, in-service teachers and pre-service teachers were asked to rate the appearance of the online program based on two key areas: 1) balance of reading and viewing and 2) diagrams and tables. Survey results for each of these areas are detailed below. This is followed by Figure 4.2 which provides an overall summary of participants' level of agreement pertaining to the appearance of the online program.

4.3.1 **Balance of Reading and Viewing.** Using the same Likert scale from 1 to 5, where 1 represents 'certainly disagree' and 5 represents 'certainly agree', participants were asked to rate the appropriateness of balance of reading and viewing. Four participants 'certainly agreed' (2 x pre-service, 1 x in-service, 1 x SLP), four 'agreed' (3 x in-service, 1 x academic), and two were 'neutral' (1 x in-service teacher, 1 x academic). Overall, 80% of participants 'agreed' to 'certainly agreed' that the balance of reading and viewing was appropriate. Qualitatively, seven participants commented positively on the balance of reading and viewing, noting that the demonstration clips were "reassuring" (1 x in-service) and "reinforcing" (1 x pre-service) in connecting theory to practice. One academic suggested the need for written text to coincide with audio texts to aid students with sensory impairments and to follow visual clips with supportive information. One way of applying this suggestion could be to provide information in multi-modes of delivery and levels of complexity such as audio, visual and text modes of all key ideas. The two pre-service teachers and the SLP all selected 'certainly agree' along with one in-service teacher. Three in-service teachers and one academic 'agreed' and a single in-service teacher and one academic were 'neutral' commenting that the text needed to be paired back significantly suggesting that a link to further information could be made available to those who wanted more. This suggests

that there are differing opinions on the balance of reading and viewing that is acceptable. Potentially, users could be given greater choice in the depth of content they access by providing the content as simplified dot points or summaries in addition to access to entire articles or sets of readings.

4.3.2 **Diagrams and tables.** In addition to rating the balance of reading and viewing within the online program, participants were asked to rate the appropriateness of diagrams and tables. Two participants 'certainly agreed' (2 x academics), six 'agreed' (2 x pre-service, 3 x in-service, 1 x SLP), one was 'neutral' (1 x in-service), and one 'disagreed' (1 x in-service). Cumulatively, 80% of participants 'agreed' to 'certainly agreed' that the diagrams or tables within the online program were appropriate. Qualitative comments (n = 5) referred to the good use of diagrams and tables to support concepts; however, one in-service teacher highlighted that some diagrams had more information than was discussed and that this could be confusing to end users. Another in-service teacher mentioned that there needed to be more diagrams for those who identify as preferring visual information. Both academics 'certainly agreed' and the SLP selected 'agree.' Two pre-service teachers 'agreed,' while in-service teachers were split between 'disagree' (n = 1), 'neutral' (n = 1), and 'agree' (n = 3). This suggests that diagrams and tables are a good way to support learning and that the information provided needs to be explicitly explained and linked to key content. Figure 4.2 below profiles overall agreement regarding the appearance of the online supplementary program.

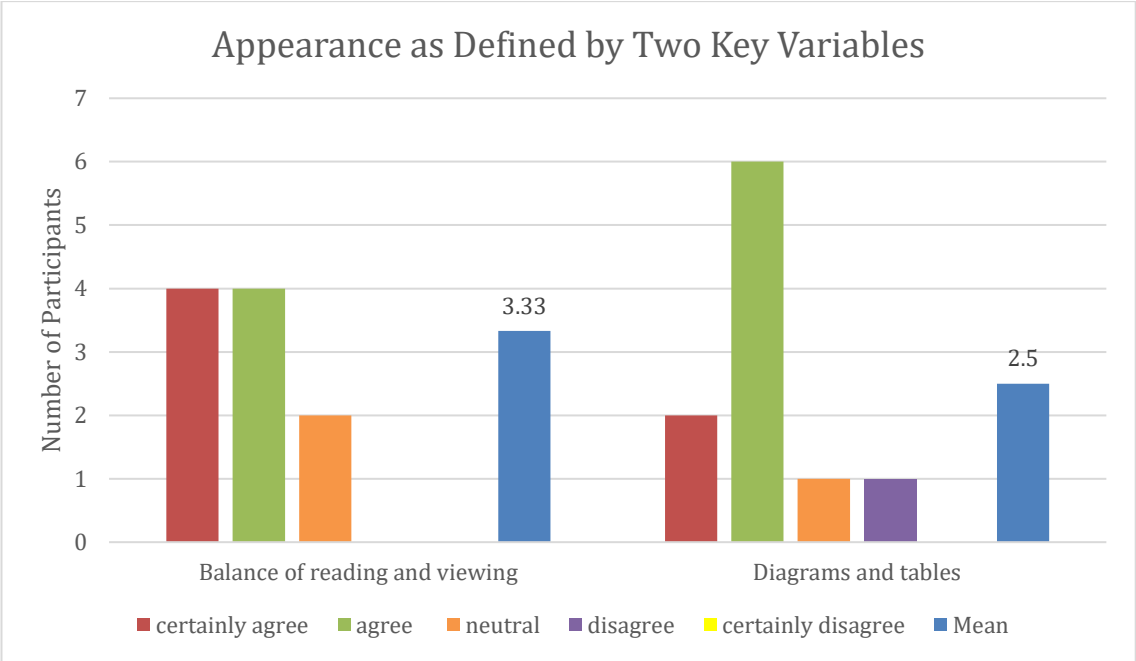

Figure 4.2 Participant agreement level for variables evaluating appearance.

4.4 Usability of the Online Supplementary Program

To evaluate this aspect of the research question, experts, in-service teachers and pre-service teachers were asked to rate the usability of the online supplementary program based on: 1) pace of content, 2) obvious navigation and icons, 3) simple language, wording and terminology, and 4) discussion opportunities. Results on usability are detailed below and are profiled in Figure 4.3.

4.4.1 **Pace of content.** Using the five-point Likert scale (i.e., 1 = 'certainly disagree' to 5 = 'certainly agree') participants were asked to rate the pace of content in terms of appropriateness. Six participants 'certainly agreed' (2 x pre-service, 2 x in-service, 1 x academics, 1 x SLP), two 'agreed' (2 x in-service,), and two were 'neutral' (1 x in-service, 1 x academic). In total, 80% of participants 'agreed' to 'certainly agreed' that the pace of content delivery within the online program was appropriate. Qualitatively, comments (n = 9) reflected an appreciation of the ability to self-pace

with access to further information via hyper-links and video demonstrations. As the modules followed the same set structure it was easy to go in and out of sections and return to information if needing further support or clarification. One in-service teacher noted that they enjoyed being able to "read, try, learn." One academic, the SLP, both pre-service teachers and two in-service teachers selected 'certainly agree.' One in-service teacher and one academic selected 'neutral' while two in-service teachers selected 'agree.' This suggests that the pace of content was appropriate especially due to the capacity to be able to move in and out of the modules as users desired.

4.4.2 **Obvious navigation and icons.** In terms of the appropriateness of obvious navigation and icons, four participants 'certainly agreed' (1 x pre-service, 1 x in-service, 2 x academics), one 'agreed' (1 x pre-service), two were 'neutral' (2 x in-service), two 'disagreed' (1 x in-service, 1 x SLP) and one did not answer (1 x in-service). This led to an 'agree' to 'certainly agree' response rate of 50%. Thematically, eight participants commented on the ease of navigating around the Moodle platform once they became familiar with the structure. Of importance, the two pre-service teachers mentioned that it was a structure that was familiar to them as it is similar to the online platform used at their university. However, six participants recognised that there were glitches with navigation icons as links had broken since construction and the quizzes were difficult to enter and manoeuvre around. One participant (1 x in-service) offered the suggestion that an introduction to navigate the site may be a useful part of the program outline including how to enter and exit sections and what activities and icons are within each module. Both academics 'certainly agreed' along with one pre-service teacher and an in-service teacher. One in-service teacher and the SLP selected 'disagree' commenting that the navigation icons did not work as fluidly as they could due to a few broken hyper-links and that the site may appear very busy (1 x SLP). This suggests that that

refinement of navigation and icons within the online program can be seen as a priority before its future implementation with final-year ITE students.

4.4.3 **Simple language, wording and terminology.** Simple language, wording and terminology was also considered a key component of supporting usability within the online program. In terms of appropriateness, six participants 'certainly agreed' (2 x pre-service, 3 x in-service, 1 x academics), one 'agreed' (1 x SLP), one was 'neutral' (1 x in-service), one marked between 'disagree' and 'neutral' (1 x in-service) and one 'disagreed' (1 x academic). In sum, 70% of participants 'agreed' to 'certainly agreed' that the simple language, wording and terminology within the online program was appropriate. Qualitatively, eight comments indicated that the language and wording was accessible, with a mixture of technical and easy to access terminology in addition to a glossary if required. One academic commented that "easy to read…should translate to easy to understand" and that it was suitable for those who were relatively new to the subject or needed a refresher. Three participants mentioned the amount of reading was substantial with one academic suggesting that the dot points were too extensive and that only those who were committed would stay with the program. One pre-service teacher commented that they appreciate all of the information in one spot as "it is much less overwhelming using a site like this rather than trying to independently source evidence-based information from textbooks/research articles." Both pre-service teachers 'certainly agreed' whilst in-service teachers were split between 'neutral' (1 x mark between 'neutral' and 'disagree,' 1 x 'neutral') and 'certainly agree' (n = 3). Academics were divided between 'certainly agree' (n = 1) and 'disagree' (n = 1) commenting that there was a high amount of text. This suggests that the program would benefit from

ensuring that the simple language, wording and terminology remains accessible going ahead.

4.4.4 **Discussion opportunities.** Participants were asked to rate the appropriateness of discussion opportunities. Four participants ‘certainly agreed’ (1 x in-service, 2 x academics, 1 x SLP), three ‘agreed’ (2 x pre-service, 1 x in-service), two were ‘neutral’ (2 x in-service), and one ‘disagreed’ (1 x in-service), leading to an overall ‘agree’ to ‘certainly agree’ rate of 70%. Six comments reflected an appreciation of discussion opportunities with comments such as loving the opportunity to share resources and they are a great way to share “growing knowledge and application of knowledge” (i.e. 1 x academic). One in-service teacher mentioned that they prefer live-conversation platforms rather than discussion forums. Four participants questioned how and why this would work whilst one academic suggested finding ways to encourage users to contribute. This suggests that the forums are a useful tool in engaging users yet further investigation of how to creatively encourage users to effectively contribute on the discussion forums could be useful. Figure 4.3 below illustrates overall levels of agreement for variables contributing to usability of the online supplementary program.

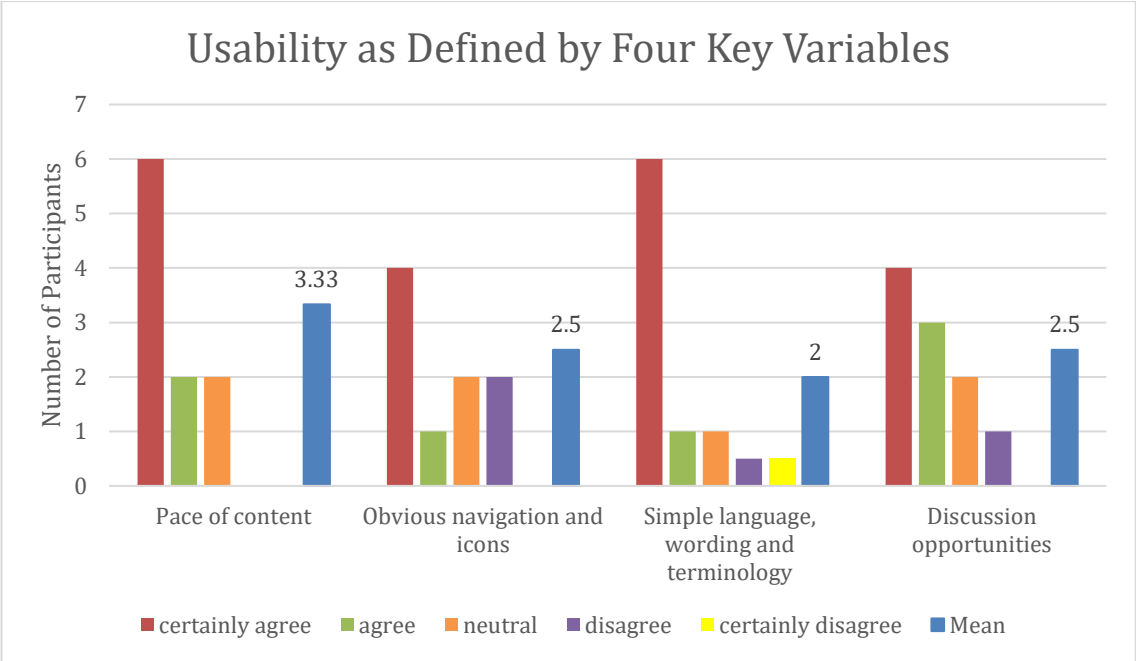

Figure 4.3. Participant agreement level for variables evaluating usability.

4.5 Credibility of the Online Supplementary Program

To evaluate the final element of this study's research question, experts, in-service teachers and pre-service teachers were asked to rate the credibility of the online supplementary program based on two variables: 1) links to other websites and 2) source of evidence and referencing.

4.5.1 **Links to other websites.** Keeping aligned with the Likert scales used in the previous survey questions, participants were asked to rate the appropriateness of links to other websites using a scale from 1 to 5 where 1 represents 'certainly disagree' and 5 represents 'certainly agree.' Six participants 'certainly agreed' (2 x pre-service, 2 x in-service, 2 x academics), three 'agreed' (2 x in-service, 1 x SLP), and one was 'neutral' (1 x in-service). Overall, 90% of participants 'agreed' to 'certainly agreed' that the links to other websites were appropriate. This is an ideal outcome given the importance of credibility to the success of online materials and learning (McGill and

McLeod, 2019). Qualitatively, eight participant's comments indicated an appreciation of further links and the quality of those links. Two participants mentioned the value of being able to explore further information if desired while one academic suggested to keep the list to a minimal stating that the program did not need to offer everything. Academics and pre-service teachers all 'certainly agreed' while in-service teachers were split between 'neutral' (n = 1), 'agree' (n = 2) and 'certainly agree' (n = 2). This suggests that links to other websites was a highly valued component of the program.

4.5.2 **Source of evidence and referencing.** In terms of appropriateness of sources of evidence and referencing, nine participants 'certainly agreed' (2 x pre-service, 5 x in-service, 1 x academics, 1 x SLP) and one 'agreed' (1 x academic). Significantly, 100% of participants 'agreed' to 'certainly agreed' that the sources of evidence and referencing within the online program were appropriate. All nine participants that commented, positively responded to the evidence-based information. Both pre-service teachers were appreciative of the links to their ITE course with one writing that they "thought the links to the Australian Professional Standards for Teachers was an awesome idea - this will be helpful to so many pre-service teachers (e.g. forming their e-portfolio) and in-service teachers (e.g. showing evidence of moving from graduate to proficient)." One academic questioned the validity of older references and suggested that those with long term traction and influence need to be referred to as such so that users are aware of the reasons for their inclusion. Academics were divided between 'agree' (n = 1) and 'certainly agree' (n = 1) whilst all other participants 'certainly agreed' (n = 8). This suggests that source of evidence and referencing is one area that is strongly supported within the modules and highly valued

by participants. Figure 4.4 illustrates overall levels of agreement for variables contributing to the evaluation of the credibility of the online supplementary program.

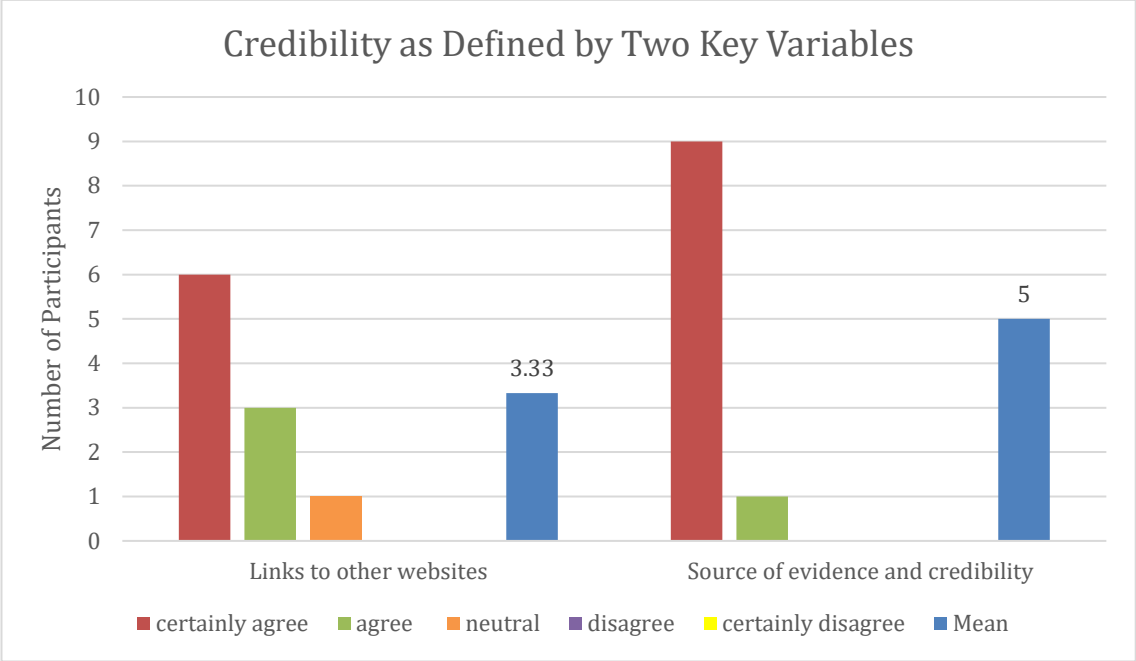

Figure 4.4. Participant agreement level for variables evaluating credibility.

4.6 Final Survey Comments

To close the survey, participants were asked to provide additional comments regarding the content, appearance, usability and credibility of the online supplementary program. Overall, comments indicated that the program was well received with participants indicating that there is benefit in such a supplementary program for final-year ITE students particularly given the importance of early reading development. One pre-service teacher noted that they felt this was an important opportunity for all ITE students "as it provides the evidence that we require to understand why we are doing what we are doing." One in-service teacher commented that they had learned things that they had not in their ITE course and renewed their passion for why it is important to

teach systematically and explicitly in the area of early reading development. An academic suggested that ‘check-ins’ at the end of each module may help to identify whether the content of the module led to new knowledge. The SLP regarded this as an “excellent initiative and could be very powerful in informing pre-service teacher knowledge.”

Chapter 5: Discussion

5.1 Introduction

This study investigated: *To what extent do experts, in-service teachers and pre-service teachers agree on the appropriateness of an online program's content, appearance, usability and credibility to increase final-year ITE students' understanding of phoneme awareness and letter–sound knowledge as important aspects of teaching children how to read?* This study included a three-stage method where the first two stages involved the sourcing of appropriate content and then formatting of that content using high-quality evidence-based features and functions to create an effective online supplementary program. The final stage of this study involved piloting the online program with experts (i.e. literacy experts in academia and speech-language pathology), teaching professionals (i.e. in-service early years primary teachers) and target users (i.e. final-year ITE students) to obtain statistical (i.e. descriptive statistics) and thematic data regarding the content, appearance, usability and credibility of the online program that will inform its use as part of a larger project in the future.

5.2 Agreement on content, appearance, useability and credibility for the online supplementary program

Overall 78% of participants 'agreed' (i.e. 'agreed' or 'certainly agreed') that the content, appearance, usability and credibility of the eight module supplementary online program are appropriate and therefore likely to be effective in raising final-year ITE students' knowledge and understanding of how to instruct and assess critical word level reading skills, namely PA and letter-sound knowledge. Identifying which parts of the online supplementary program are appropriate and are of a high quality across our four key areas (i.e. content, appearance, usability and credibility) is important for refining the program for trial with final year ITE students and is aligned with current federal

education initiatives to ensure pre-service teachers are graduate-ready to teach evidence-based reading instruction (The Hon Dan Tehan MP, 2019). The aim of this online program is to supplement existing ITE topics (i.e. English Curriculum Studies 1, English Curriculum Studies 2, Students with Literacy Difficulties, Intervention for Students with Literacy Difficulties), as well as new 2020 ITE topics (i.e. Language Development), and to act as a bookend to the learning for final year ITE students who intend on seeking employment as a Foundation, Year 1 or Year 2 teacher. Further studies could see this course link to ITE programs more broadly.

5.2.1 **Agreement on the quantity of content of the online program.** Research indicates that the quantity of content on online platforms, including online programs, is imperative for supporting student learning (Koehler et al., 2013). This is particularly important in the area of early reading development where, as discussed in Chapter 1, many ill-informed pedagogies (i.e. whole language, RR, 3-cueing systems) have predominated teacher practice with only currently there being the shift towards evidence-based practices such as those outlined in the National Reading Panel (2000), The Rose Report (Rose, 2006), and the Australian National Inquiry into the Teaching of Reading (Rowe, & NITL [Australia], 2005).

In this study, 76% of participants 'agreed' (composite of 'certainty agree' and 'agree') that the content, as thoroughly sourced in the first stage of the research method, was of high quality as determined by responses to questions regarding: 1) quantity of content (90%, 5 x 'certainly agree' and 4 x 'agree'); 2) practical activities (80%, 5 x 'certainly agree' and 3 x 'agree'); 3) printable resources (80%, 5 x 'certainly agree' and 3 x 'agree'); 4) linguistic activities (80%, 7 x 'certainly agree' and 1 x 'agree'); 5) video files (90%, 6 x 'certainly agree' and 3 x 'agree'); and 6) case studies (40%, 2 x 'certainly agree' and 2 x 'agree'). Most commonly, participants commented on the

helpfulness and extensiveness of the content information and the fact that there was evidence-based knowledge provided in a variety of modes to strengthen and deepen understandings of the key concepts and what they looked like in practice. Teaching reading requires extensive skills and knowledge that needs to be prioritised among the wide range of subjects taught across the Australian Curriculum particularly within Reception -7 Primary Schools (Rowe & NITL [Australia], 2005). The program trialled in this research that is supplementary and targeted at those who are aiming to teach within the lower levels of Primary school, has, according to pilot feedback, the potential to support the refined up-skilling of pre-service teachers in the area of word-level reading assessment and instruction just prior to becoming a registered junior primary teacher.

A single learning platform where evidence based content and further quality resources are available was valued specifically by pre-service participants who commented that they "wish[ed]" (2019) this tool was available within their current ITE course to prevent the time taken to find this information themselves within text books and research articles. Furthermore, pre-service teachers noted that they did not necessarily know what quality resource material looked like which is consistent with Moats' (2014) reporting of the struggles that ITE students have in sourcing and identifying quality resources. This may be responsible for the persistent circulation of past methodologies and theories as ITE students could not differentiate between quality evidence-based practice and other less effective practices. Multimodal presentations (e.g. peer interactions, quizzes, printable resources, and handouts) of content were reported to help reinforce the information provided and supported knowledge of how to apply the knowledge within the classroom. While it is reported that more than half of ITE students feel unenthusiastic about reading themselves (Binks-Cantrell et.al., 2012),

a single platform that is user paced is one way that ITE students can source key content efficiently and effectively particularly when they are preparing to enter or on the cusp of entering the teaching workforce.

Evidence has demonstrated that teachers themselves often lack foundational linguistic skills that underpin early reading success (Carroll et. al., 2012; Moats & Foorman, 2003; Moats & Lyon, 1996) leading to the Peter principle (Applegate & Applegate, 2004) whereby a teacher cannot teach something they do not know. In this study, participants valued the Linguistic Quizzes and Myth Busters to help identify areas of strength and weakness in personal language skills and knowledge about reading. One pre-service participant stated that they had attended an external course on Jolly Phonics® to build a foundation of knowledge on reading instruction as they felt that it was "too briefly brushed over" within their current undergraduate course. Further, research indicates that teachers often report having a strong sense of knowledge about how to teach early reading skills; however, as reported by Carson and Bayetto (2018), there is a significant gap between reported and actual skill. Moreover, Levine 's (2006) findings, that 62% of ITE course alumni reported that their course did not adequately prepare their graduate students for the realities of today's classroom, indicate that students are not always graduate ready to teach reading. Research conducted in America noted that 59% of ITE programs addressed two or fewer of the five key pillars of reading success, whilst 79% were deemed inadequate at preparing teachers to address the needs of struggling readings, including those with learning disabilities (Greenberg, McKee & Walsh, 2013). Further, the importance of ensuring evidence-based instruction is utilised to support children with learning 'how to' read was illuminated by The Hon Dan Tehan (Australian Federal Minister for Education) requesting all ITE degrees ensure students are proficient in teaching skills such as letter-sound knowledge (Media

Release, 2019). In the current study, it was important that specific and general feedback was positive in that the program provided a link between what is recognised, both in the past and in the present, as a weakness for in-service teachers, university ITE courses, and federal initiatives, as this would support our efforts to ensure the science of reading instruction is at the forefront of pre-service teacher education in Australia.

5.2.2 **Agreement on the appropriateness of appearance of the online program.** Research indicates that the appearance and architecture of an online program, aligned with PPL (Brandt, 1998) and TPACK (Koehler et al., 2013), are important for ensuring maximum outcomes for learners, especially for final-year ITE students about to become teachers. In this study, 80% of participants 'agreed' that the appearance of the online program was satisfactory based on responses relating to: 1) balance of reading and viewing (80%, 4 x 'certainly agree' and 4 x 'agree') and 2) diagrams and tables (80%, 2 x 'certainly agree' and 6 x 'agree'). Participants commented on the importance of having a break from reading text and to consolidate their understanding through other means, especially through the demonstration clips. These findings are consistent with layout and design elements for online learning posited by Lynch and Hortons (2016), links with appearances that support the learning environment as indicated by the PPL (Brandt, 1998), and provide a balance of visual and text as referred to by Katz and aths (1985).

Although appearance scored well in the survey (i.e. 80% 'agree'), there were several comments that require further investigation and will be considered in the future. For example, the audio introductions were positively received by one participant (i.e. pre-service) while another found the audio alone difficult to process and suggested the inclusion of a script (i.e. academic) to accommodate sensory impairments. Further, the use of dot-points was commended; however, the amount of text was negatively

regarded on several occasions throughout the survey (e.g. "…I felt overwhelmed by the amount of content", pre-service); "…it needs to be significantly pared back…" (i.e. academic) with requests for more visual material (e.g. "Need more [diagrams and tables] for visual learners", academic). Addressing such challenges for a future large-scale study will be discussed below.

5.2.3 **Agreement on the appropriateness of usability of the online program.** Research indicates that usability is vital for student accessibility and enjoyment as it directly influences how they learn (Brandt, 1998). Koehler and Mishra's Technological Pedagogical Knowledge (Koehler et al., 2013) states that the instructor (in this study, the author) must know how technology changes teaching and learning, including knowledge of how technology affords or constrains learner access. Further, research by McGill and McLeod (2019) identified that obvious navigation and icons are a critical feature (i.e. ranked as number 1 out of their top ten features in their study) for supporting efficient and user-friendly access to information in an online format. Importantly, participants in this study generally 'agreed' that the usability of the program was satisfactory based on the results to questions relating to: 1) pace of content, 2) obvious navigation and icons, 3) simple language, wording and terminology, and 4) discussion opportunities. Total usability results (i.e. 62.5% 'agree') indicated that although generally participants were satisfied, this was the lowest scoring component of the program compared to the other three key-areas that participants provided feedback on (i.e. content, appearance and credibility). The highest scoring sub-areas of usability were pace of content (80%, 6 x 'certainly agreed' and 2 x 'agreed'), simple language, wording and terminology (70%, 6 participants 'certainly agreed' and 1 x 'agreed') and discussion opportunities (70%, 4 x 'certainly agreed' and 3 x 'agreed'). These three sub-areas showed close alignment to research regarding critical features that support

usability for online learning (Koehler et al., 2013; Lynch & Horton, 2016). Features that enhanced usability for participants include the repetition of program structure for easy navigation which allowed the user to "flick" (i.e. in-service) back and forth between areas for more or less information, contrasting hyperlink colours, and language pitched at an appropriate level being regarded as "easy to read, should translate as easy to understand" (i.e. academic). The lowest scoring usability sub-area was obvious navigation and icons (50%, 4 x 'certainly agreed' and 1 x 'agreed'). Many comments relating to this area concerned glitches with hyperlinks and problems navigating around the linguistic quiz. These difficulties can be attributed to the participants accessing the online program via the administration code which meant that the quizzes appeared partially completed. Participants comments suggests that navigation and icons is an area to focus refinement and improvement upon. It is likely that subscribing to a paid version of Moodle, as opposed to the free version used in this master's project, will address these issues in the future.

5.2.4 **Agreement on the credibility of the online program.** Credibility of information is frequently cited as a pivotal feature of online material, including online courses (McGill and McLeod, 2019; Wierzbicki, 2018). Indeed, in McGill and McLeod's (2019) study evaluating important features to include in a website to support active waiting for parents waiting for paediatric speech-language pathology services, credibility of information was rated as highly valuable, including sources of evidence and referencing and links to other websites. Wierzbicki's (2018) credibility evaluation method states that seeking knowledge from trusted objective experts met the criteria for source credibility. In this study, participants highly 'agreed' (i.e. 95% 'agree') on the credibility of evidence-based content and trustworthy extended reading opportunities that formulated the online supplementary program. This was highlighted in responses to

the questions regarding: 1) links to other websites (90%, 6 x ‘certainly agreed’ and 3 x ‘agreed’) and 2) source of evidence and referencing (100%, 9 x ‘certainly agreed, and 1 x ‘agreed’). Credibility of sources is paramount in the area of how young children learn to read particularly with the large quantity of pseudoscience in classrooms over the last 30-years leading to a long-term debate about how best to teach children to read (Robinson, 2019). With a significant number of Australian children ‘at-risk’ (AEDC, 2009) of failing to learn the foundational skills that inform early reading success, the Minister for Education (The Hon Dan Tehan MP, 2019) is tasking the Australian Institute for Teaching and School Leadership (AISTL) with providing expert advice, citing that there is clear evidence, to ensure that the fundamentals of literacy (PA, letter-sound knowledge, vocabulary development, reading fluency, comprehension) are part of the national accreditation standards for ITE. This online supplementary program was in development prior to this additional push for evidence-based instruction in early reading from a federal level, and is clearly aligned with a national priority to get all young children off to a great start on their reading journey.

5.3 Implications and future directions for the online program

Supporting final-year ITE students to be able to use the science of reading to assess and teach word-level reading skills is a critical step towards supporting the reduction of reading difficulties in Australian schools. University teacher education courses play a pivotal role in supporting the shift away from pseudoscience methods of teaching reading (i.e. whole language instruction) and towards what the research evidence has been identifying for over 20-years (i.e. National Reading Panel Meta-Analysis). Using feedback from participants in this study, the online supplementary program will be refined and used as part of a larger study that will a) evaluate translation of new knowledge into practice, b) monitor retention of knowledge, c)

integrate new online features such as a live, interactive web sessions for personalised or group support and d) include peer interaction and coaching. At this stage the program is designed for final-year ITE students; however, in the future this could be extended to first year students, in-service teachers and parents, whereby a certification of completion could be generated upon completion. Several features to be considered as part of the future directions of this emerging body of work are described below.

5.3.1 **Program structure.** In light of feedback questioning student engagement with the program, such as an academic asking why students would participate in discussion forums and what would keep students committed to finishing the modules, further investigation on how best to capture student motivation and retention needs to be conducted. Retention of student engagement and motivation has been linked to narrative consistency (Kulkofsky, Wang & Ceci, 2008; Wang, Bui, & Song, 2015). Pike and Gore (2018) investigated the transformation of a course with a history of poor engagement and retention by redesigning the way that information was revealed and including more participant interaction. A lighter style may be more encouraging for users as this is seen as a supplementary program to bookend what students have already received. The inclusion of more narrative in the form of case studies and simulated interactive classroom practice are examples of ways that narrative consistency can become a part of the program's structure.

5.3.2 **Quantity of content.** Quantity of content was a contested response as one academic and one in-service teacher responded several times, to different questions (quantity of content, balance of reading and viewing, simple language and terminology, links to other websites, and sources of evidence and references), that they felt there was too much content and in its current format users could be put-off or possibly skip over information. This issue will become part of a future evaluation of similar educational

platforms to decipher how much content is appropriate for a supplementary program. Furthermore, future research will evaluate the value of the suggestion by the academic of offering levels of information (e.g. ‘core’ and ‘extended’) so that users can choose how much content they are willing to engage with at one time to get the entire picture of each module without skimming or skipping sections.

5.3.3 **Navigation and Icons.** Several participants commented on challenges with navigation and icons, particularly experiencing difficulty with the Linguistic activities. For example, difficulties included viewing all of the essential information without needing to scroll down. This means that in the current format participants may miss important information. In the future this will be an area that will be supported via a subscripted version of the platform whereby the researcher will have more control over the usability of the interface by omitting irrelevant icons, such as grading, competencies, and badges in the side menu bar and ensuring that all information is within the single screen, as mentioned above. Conducting an evaluation of similar educational platforms will also provide information on how to successfully manage user navigation. Research connects navigation behaviour and strategies with successful hypertext reading (secondary text that is layered within primary text via hyperlinks) and learning outcomes (Lawless & Kulikowich, 1996; Naumann, 2010; Naumann, Richter, Flender, Christmann & Groeben, 2007; Salmerón & García, 2011; Salmerón, Kintsch & Kintsch, 2010). The results of Hahnel et al.’s (2016) research on the effects of linear reading, basic computer skills, evaluating online information, and navigation on reading digital text showed that competent readers select and re-visit more pages

with task-relevant information indicating that educating and encouraging users to navigate through the multiple layers of information may support deeper learning.

5.3.4 **Printable resources.** McGill and McLeod's (2019) research found printable resources to be a part of their top ten most valued features, yet in this study this was an area that participants' results spread from 'certainly agree' through to 'disagree.' One in-service teacher, whom selected 'disagree' as their answer, commented that they did not feel that the printable resources were prominent enough and could be more beneficial if they were able to be opened in a separate tab. This is an area that will require further exploration to ensure there are obvious printable materials that supports theory to practice for users. As with navigation and icons above, Hahnel et al.'s (2016) research implies that consistent placement and obvious iconography may support users to find printable materials, otherwise users may miss relevant or extra information printable resources that can deepen learning

5.4 Limitations

Given this study was pilot in nature and has been completed within the restrictions of time and resources of a master's program, there are a series of limitations that require acknowledgment and will be considered as part of future actions when this research becomes a part of a PhD project in the future. These limitations include: time, resources, sampling, and social and learner equality.

The *time frame of a master's program* (75% coursework, 25% research) proved a limitation in gathering more extensive data related to the potential effectiveness of the online supplementary program. Specifically these included a) observing pre-service teachers as they use the online program to directly identify navigation and icon issues, b) evaluating the benefits of including instructions on how to use a tool such as the 'Trash it or Trust it' tool (Genetic Alliance, 2013) to assist ITE students to identify

existing quality sources on the web and c) evaluation of equal access opportunities and transforming information so that all users have accessibility to all content in multiple ways either for necessity or personal preference (i.e., providing script and audio options of all information to accommodate sensory impairments as mentioned by one participant (i.e. academic).

In terms of resources, due to budget limitations, the free version of Moodle was utilised. This version had a maximum down load of 200 megabytes which proved to be an issue at the final stages of designing the program. Recognising that ITE students are they themselves learners from a broad and diverse background, this program was intended to provide learning access for all types of learners and in response to this, where possible, a multi-modal presentation strategy has been used to give participants equal opportunity to explore the information via visual, auditory and written formats. Intentions to provide aesthetic visual relief and vary the tone of the modules via humorous comic clips and images were stilted by the fact that the primary content and demonstration clips within each module used the allocated memory allowance. Further limitations included having no control over customizing the style such as colours and fonts, leaving the overall appearance generic.

The researcher acknowledges the limitations of the *restricted sample size*. This was a pilot study intended to gather initial feedback on the content, appearance, usability and credibility of the online program with the intention to extend on the sample size in the future to allow for greater depth and refinement of these four key areas. As such the researcher acknowledges that the data collected by the restricted sample size within this research cannot be translated to general terms and further research will need to be conducted for generalisation to occur.

Finally, the researcher acknowledges that *in the future this program can be refined to include content about learner profiles and unique learning needs*. For example, the program will include specific reference to children who come from backgrounds other than English, Indigenous perspectives within an educational system based on English cultural values, economical advantage and disadvantage, children within the guardianship of the Minister, and children with disabilities, and more. Teachers need to have an understanding of the social diversity from which their students come (Comber & Woods, 2016). These authors impress that one area that cannot change is the teacher's commitment to high-equity and high-quality education for all students. This acknowledgment of teachers requiring strategies to actively engage in student diversity addresses the enduring reality that inequality is a significant factor in underachievement in education.

The next step of this research will involve refinement of the online program based on feedback collected in this master's project. Following this, it is intended that the polished version of the supplementary online program will be pilot tested with finally-year pre-service teachers prior to their final professional placement.

5.5 Conclusion

This three-stage study enabled researcher to evaluate the *appropriateness of an online program's content, appearance, usability and credibility to increase final-year ITE students' understanding of phoneme awareness and letter–sound knowledge as important aspects of teaching children how to read.* Feedback from experts (academics and speech and language pathologists), in-service teachers and intended target users (i.e. pre-service teachers) identified the strengths and areas for further refinement for the online supplementary program. Currently the Australian Minister of Education (The Hon Dan Tehan MP, 2019) acknowledges the shortfall in ITE course delivery related to fundamental skills that underpin early reading success, and has taken steps to ensure that ITE courses are providing content knowledge based on the scientific evidence of teaching reading. Results from this master's study indicate that the online program was received positively by participants as a bridging mechanism for ITE students in their final-year of study into the teacher workforce. As part of the emerging awareness and shift towards the embracement of evidence-based reading practices, the research in this master's thesis, and beyond, hopes to ensure that *no pre-service teacher is left behind* when it comes to being a skilled early reading teacher.

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Appendix

Appendix A Quartile 1 Journals

Annals of Dyslexia

Applied Cognitive Psychology

Asia Pacific Journal of Speech Language and Hearing

Assessment for Effective Intervention.

Attention and performance - not yet assigned a rank

Australian and International Journal of rural Education

Australian Journal of Learning Difficulties

Australian Journal of Teacher Education

Behavioural and Brian Sciences

British Journal of Educational Technology

British Journal of Psychology

Child Development

Child Development Perspectives

Child Language Teaching and Therapy,

Cognition

Communication Disorders Quarterly

Computers in Human Behavior

Decision Sciences Journal of Innovative Education

Developmental Psychology

Developmental science

Discourse Processes

Distance education

Education Journal

Educational Psychology

Educational Research Review

Educational researcher

European Journal of Teacher Education

Health Education Research

International Journal of Speech-Language Pathology

International Review of Research in Open and Distance Learning

Internet and higher education

Journal of Adolescent & Adult Literacy

Journal of Child Psychology and Psychiatry

Journal of Educational Computing Research,

Journal of Educational Psychology

Journal of Learning Disabilities

Journal of literacy research

Journal of Research in Reading

Journal of Teacher Education

Kappa Delta Pi Record,

Language Speech and Hearing Services in Schools

Learning and Individual Difference

Learning and Instruction

Learning Disability Quarterly

Memory

Neuropsychologia

Paedagogica Historica

Perspectives on language and literacy

Policy

Psychological Bulletin

Psychological Review

Psychological Science

Psychological Science in the Public Interest

Reading & Writing Quarterly

Reading and Writing

Reading and Writing: An Interdisciplinary Journal

Reading Research Quarterly

Remedial and Special Education

Review of Educational Research

School Effectiveness and School Improvement

Science

Scientific Studies of Reading

Teacher and teacher education

Teachers College Record

Teaching and Teacher Education

Teaching and Teacher Education: An International Journal of Research and Studies

The Reading Teacher

Topics in language disorders

Other Journals.

The Internet and Higher Education

Computers in Human Behaviour

The Association for the Advancement of Computing in Education (AACE) journal

Contemporary Issues in Technology and Teacher Education

International Journal of Instructional Technology and Distance Learning

Appendix B Keywords

Developmental changes reading/reading disability

Early career teachers' self-efficacy

Early prediction of reading comprehension

Early reading skills

Explicit phonological knowledge of educational professionals

Explicit teaching

History of teaching reading

Learning to read

Letter-sound knowledge

Literacy assessment

Literacy debate

Literacy disability

Literacy instruction

Models of reading acquisition

On-line course design

On-line learning

Phoneme awareness

Phoneme detection

Phonics

Phonics check

Phonological awareness

Practice standards for teaching reading

Preparation/initial teacher education

Pre-service teachers' literacy self-efficacy/competence

Reading risk

Reading wars

Reading, instructional practices, perceptions, preservice teaching,

Scientific evidence for effective teaching of reading.

Simple view framework

Synthetic phonics

Teacher preparation

Phonological awareness assessment practices, self-reported knowledge and actual knowledge

Teaching decoding

The causal role of phoneme awareness and letter-sound knowledge

Theories of reading acquisition

TPCK

Appendix C International Government Documents

National Council in Teacher Quality (2006). *What education schools aren't teaching about reading and what elementary teachers aren't learning*.

Organisation for Economic Co-Operation and Development (2004). *Learning for Tomorrow's World: First Results from PISA 2003.*

Organisation for Economic Co-Operation and Development (2005). *Annual Report-2005.*

Organisation for Economic Co-Operation and Development (2009). *Creating Effective Teaching and Learning Environments: First Results from TALIS*

Organisation for Economic Co-Operation and Development (2014). *PISA 2012 Results in Focus What 15-year-olds know and what they can do with what they know*

Reading Recovery Council of North America (2015). *Early Literacy Learning.*

Scottish Executive Education Department (2003). *Accelerating reading and spelling with synthetic phonics: A five year follow up.*

Scottish Executive Education Department (2005). *A seven-year study of the effects of synthetic phonics teaching on reading and spelling attainment*.

Scottish Executive Education Department (2019). *Insight 17 A Seven Year Study of the Effects of Synthetic Phonics Teaching on Reading and Spelling Attainment The Insight Series A Seven Year Study of the Effects of Synthetic Phonics Teaching on Reading and Spelling Attainment.*

TIMSS & PIRLS International Study Centre (2001). *PIRLS 2001 International Report: IEA's Study of Reading Literacy Achievement in Primary Schools in 35 Countries*.

TIMSS & PIRLS International Study Centre (2006). *IEA's Progress in International Reading Literacy Study in Primary Schools in 40 Countries*.

TIMSS & PIRLS International Study Centre (2011). *The PIRLS 2011 International Results in Reading.*

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U.S. Department of Education. Washington D.C (2007). *Literacy in Everyday Life: Results From the 2003 National Assessment of Adult Literacy.*

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World Literacy Foundation (2015). *The Economic & Social Cost of Illiteracy: A snapshot of illiteracy in a global context.*

World Literacy Foundation (2017). *Annual Report 2016 – 2017.*

Appendix D National Government Documents

Australian Curriculum Assessment and Report Authority (ACARA) (2008). Australian Curriculum. https://www.australiancurriculum.edu.au/

Australian Council for Educational Research (2012). *Highlights from TIMSS & PIRLS 2011 from Australia's perspective*.

Australian Council for Educational Research (2012). *Monitoring Australian Year 4 student achievement internationally: TIMSS and PIRLS 2011*.

Australian Early Development (2009). *Census Definition of AEDC terms*.

Australian Early Development Census (2017). *Percentage of children at risk in 2015*.

Australian Government (2016). *Closing the Gap Prime Minister's Report*.

Commonwealth of Australia (2005). *Prepared to teach. An investigation into the preparation of teachers to teach literacy and numeracy.*

Department for Education (2019). *Phonics Screening Check.*

Department of Education Training and Youth Affairs: Canberra ACT (2000). Mapping the territory in primary students with learning difficulties: Literacy and numeracy Vols. 1, 2 & 3

Department of Education Science and Training (2005). *National Inquiry into the Teaching of Literacy*.

Government of South Australia (2011). *Phonics Research into practice. Understanding the reading process*.

National Reading Panel (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction Reports of the sub-groups.*

NSW Department of Education (2015). *Reading Recovery: a sector-wide analysis***.**

Appendix E AITSL Standards

Module Links to Australian Professional Standards for Teachers

Excerpts taken from Australian Professional Standards for Teachers: February 2011

Available in entirety from https://www.aitsl.edu.au/docs/default-source/apst-resources/australian_professional_standard_for_teachers_final.pdf

Professional Knowledge		
Focus Area	Graduate	Module
Standard 1 – Know students and how they learn		
1.2 Understand how students learn	Demonstrate knowledge and understanding of research into how students learn and the implications for teaching.	Module 1 Module 8
1.5 Differentiate teaching to meet the specific learning needs of students across the full range of abilities	Demonstrate knowledge and understanding of strategies for differentiating teaching to meet the specific learning needs of students across the full range of abilities.	Module 5 Module 8
1.6 Strategies to support full participation of students with disability	Demonstrate broad knowledge and understanding of legislative requirements and teaching strategies that support participation and learning of students with disability.	Module 5

Standard 2 – Know the content and how to teach it		
2.1 Content and teaching strategies of the teaching area	Demonstrate knowledge and understanding of the concepts, substance and structure of the content and teaching strategies of the teaching area.	Module 1 Module 2 Module 4
2.2 Content selection and organisation	Organise content into an effective learning and teaching sequence.	Module 3
2.3 Curriculum, assessment and reporting	Use curriculum, assessment and reporting knowledge to design learning sequences and lesson plans	Module 6
2.5 Literacy and numeracy strategies	Know and understand literacy and numeracy teaching strategies and their application in teaching areas.	Module 8
Professional Practice		
Focus Area	Graduate	Module
Standard 3 – Plan for and implement effective teaching and learning		
3.1 Establish challenging learning goals	Set learning goals that provide achievable challenges for students of varying abilities and characteristics.	All modules - Gillon's skill progressions
3.2 Plan, structure and sequence learning programs	Plan lesson sequences using knowledge of student learning,	Module 3

	content and effective teaching strategies.	
3.3 Use teaching strategies	Include a range of teaching strategies.	Module 5 Module 8
3.4 Select and use resources	Demonstrate knowledge of a range of resources, including ICT, that engage students in their learning.	Module 1 Module 8
Standard 4 – Create and maintain supportive and safe learning environments		
4.2 Manage classroom activities	Demonstrate the capacity to organise classroom activities and provide clear directions.	Module 3
Standard 5 – Assess, provide feedback and report on student learning		
5.1 Assess student learning	Demonstrate understanding of assessment strategies, including informal and formal, diagnostic, formative and summative approaches to assess student learning.	Module 7
5.2 Provide feedback to students on their learning	Demonstrate an understanding of the purpose of providing timely and appropriate feedback to students about their learning.	Module 6 Module 7

5.4 Interpret student data	Demonstrate the capacity to interpret student assessment data to evaluate student learning and modify teaching practice.	Module 6 Module 7
Professional Engagement		
Focus Area	Graduate	Module
Standard 6 – Engage in professional learning		
6.2 Engage in professional learning and improve practice	Understand the relevant and appropriate sources of professional learning for teachers	All modules – suggestions for further exploration
Standard 7 - Engage professionally with colleagues, parents/carers and the community		
7.4 Engage with professional teaching networks and broader communities	Understand the role of external professionals and community representatives in broadening teachers' professional knowledge and practice.	This course

Appendix F Australian Curriculum

Module links to the Australian Curriculum

Excerpts taken from Australian Curriculum 2015

Available in entirety from https://docs.acara.edu.au/resources/English_-_Sequence_of_content.pdf

ACARA Australian Curriculum	
ENGLISH: SEQUENCE OF CONTENT F-6 STRAND: LANGUAGE	
Standard	Module
· Phonological and phonemic awareness of the ability to identify the discrete sounds in speech (phonemes), and to reproduce and manipulate them orally	· Module 2
· Alphabet and phonic knowledge - The relationship between sounds and letters (graphemes) and how these are combined when reading and writing	· Module 4

Appendix G The International Dyslexia Association (IDA) Standards for Competent Teachers of Reading

Module Links to The International Dyslexia Association Knowledge and Practice Standards for Teachers of Reading.

The International Dyslexia Association. (2018, March). Standard 1: Foundations of literacy acquisition. *Knowledge and Practice Standards for Teachers of Reading*. p.12. Retrieved from https://dyslexiaida.org/knowledge-and-practices/

Knowledge and Practice Standards for Teachers of Reading Includes Knowledge and Practice Examples		
STANDARD 1: FOUNDATIONS OF LITERACY ACQUISITION		
Standard	Examples of Coursework Expectations	Module
1.2	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 1 · Module 3

1.3	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 2 · Module 4
1.4	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 1 · Module 5
1.5	· Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 2 · Module 4

1.6	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 1
1.7	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5
1.8	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 1 · Module 2 · Module 4

1.9	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 3

The International Dyslexia Association. (2018, March). Standard 2: Knowledge of diverse reading profiles, including dyslexia. *Knowledge and Practice Standards for Teachers of Reading*. p.13. Retrieved from https://dyslexiaida.org/knowledge-and-practices/

Knowledge and Practice Standards for Teachers of Reading Includes Knowledge and Practice Examples		
STANDARD 2: KNOWLEDGE OF DIVERSE READING PROFILES, INCLUDING DYSLEXIA		
Substandard	Examples of Coursework Expectations	Module
2.3	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5

2.4	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5
2.5	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5

The International Dyslexia Association. (2018, March). *Standard 3: Assessment. Knowledge and Practice Standards for Teachers of Reading*. p.15. Retrieved from https://dyslexiaida.org/knowledge-and-practices/

Knowledge and Practice Standards for Teachers of Reading Includes Knowledge and Practice Examples		
STANDARD 3: ASSESSMENT		
Substandard	Examples of Coursework Expectations	Module
3.1	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 6 · Module 7
3.2	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 6 · Module 7

3.5	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 6 · Module 7
3.6	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 6 · Module 7

3.8	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 6 · Module 7

The International Dyslexia Association. (2018, March). Standard 4: Structured literacy instruction A: Essential principles and practices of structured literacy instruction. *Knowledge and Practice Standards for Teachers of Reading*. p.16. Retrieved from https://dyslexiaida.org/knowledge-and-practices/

Knowledge and Practice Standards for Teachers of Reading Includes Knowledge and Practice Examples		
STANDARD 4: STRUCTURED LITERACY INSTRUCTION A: ESSENTIAL PRINCIPLES AND PRACTICES OF STRUCTURED LITERACY INSTRUCTION		
Substandard	Examples of Coursework Expectations	Module
4A.1	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 1 · Module 3 · Module 8
4A.2	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5

4A.3	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5

The International Dyslexia Association. (2018, March). Standard 4: Structured literacy instruction B: Phonological and phonemic awareness. *Knowledge and Practice Standards for Teachers of Reading*. pp. 17-18. Retrieved from https://dyslexiaida.org/knowledge-and-practices/

Knowledge and Practice Standards for Teachers of Reading Includes Knowledge and Practice Examples		
STANDARD 4: STRUCTURED LITERACY INSTRUCTION B: PHONOLOGICAL AND PHONEMIC AWARENESS		
Substandard	Examples of Coursework Expectations	Module
4B.2	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	• Module 2 · Module 3

4B.3	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	• Module 2 · Module 4
4B.4	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	• Module 2 · Module 3 · Module 4
4B.5	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	• Module 2 · Module 3 · Module 4
4B.6	Please see the following link for details https://dyslexiaida.org/knowledge-and-practices/	· Module 5

Appendix H Dean of School approval

Hi Kelly,

Thanks for getting in touch. The project looks really interesting – though, could maybe do with a shorter title.

I have found out that you have ethics approval – so happy to approve.

Good luck with your research!

-Mike

_____

Mike Nicholls

Professor of Psychology

Dean of Research

College of Education, Psychology & Social Work

Sturt Road, Bedford Park South Australia 5042

GPO Box 2100 Adelaide SA 5001

P: +61 8 8201 2425 **I** F: +61 8 8201 3877

E: mike.nicholls@flinders.edu.au **I** www.flinders.edu.au/people/mike.nicholls

Appendix I Email script: contact inviting participation in providing feedback

Dear ….

Flinders University is inviting volunteers from the professions of Speech and Language Pathology, Psychology, Academics, Registered Teachers, and Pre-service Teachers to participate in a research project conducted by a Masters of Special Education student titled *'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'*

Volunteers will be asked to sight and provide feedback of an online course designed to supplement pre-service teachers' understandings and skills of assessment and instruction of foundational reading skills namely phonological awareness and phonics by filling out a short survey. Willing participants are invited to review the attached documents for further details: An introductory letter from the supervisor, information letter, and consent form.

If you choose to participate please sign the consent form and return by email to neum0025@flinders.edu.au. Ethics approval has been granted for the research, Project number 8405.

Once consent has been received you will be supplied with the access details for the course, the survey and date of completion.

Warm regards

Kelly Neumann

Appendix J Letter of Introduction

Date

LETTER OF INTRODUCTION

(for speech and language pathology, psychology, academics, teachers and pre-service teachers)

Dear Sir/Madam/Name

This letter is to introduce Kelly Neumann who is a Masters of Special Education student in the College of Education, Psychology and Social Work at Flinders University.

She is undertaking research leading to the production of a thesis or other publications on the subject of *'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'*

She would like to invite you to assist with this project by agreeing to sight the eight modules of the online program and complete a survey that we estimate will take between 45 and 60 minutes of your time in total.

Be assured that any information provided will be treated in the strictest confidence and none of the participants will be individually identifiable in the resulting thesis, report or other publications. With your consent, we would like to acknowledge your expert contribution to this online course by including your name in our acknowledgement section of the final course version. You are, of course, entirely free to discontinue your participation at any time or to decline to answer particular questions.

Any enquiries you may have concerning this project should be directed to me at the address given above or by telephone on 82015486 or e-mail karyn.carson@flinders.edu.au

Thank you for your attention and assistance.

Yours sincerely

Dr Karyn Carson (PhD, BSLT)
Researcher & Lecturer in Special Education
Post-Graduate Co-ordinator (Special Education) | Master of Teaching co-ordinator (Special Education)
College of Education, Psychology & Social Work
Sturt Road, Bedford Park, South Australia 5042
GPO Box 2100 Adelaide SA 5001

P: Email is best | E: karyn.carson@flinders.edu.au
On-Campus: Monday, Tuesday
Adjunct: Adjunct Senior Fellow, College of Education, Health & Human Development, Canterbury University, New Zealand

Appendix K Information Sheet

INFORMATION SHEET

(for *speech and language pathologists, psychologists, academics, teachers, and pre-service teachers*)

Title: *'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'*

Researcher

Mrs Kelly Neumann

College of Education, Psychology and Social Work

Flinders University

Tel: 8201 5486

Principle Supervisor

Dr Karyn Carson

College of Education, Psychology and Social Work

Flinders University

Tel: 8201 5486

Co-Supervisor

Dr Jane Jarvis

College of Education, Psychology and Social Work

Flinders University

Tel: 8201 3798

Description of the study

This study is part of the project titled 'Pilot testing an online professional learning program designed to support preservice teachers' phonological awareness and

phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'

This project will seek feedback from professionals in the multiple domains of speech and language pathology, psychology, educational academics, and in-service teachers, and pre-service teachers as the target user to investigate the validity and usability of a newly developed online professional learning program that offers fourth year pre-service teachers, prior to their final professional placement, the opportunity to supplement their understandings and skills of teaching and assessing evidence based foundational reading skills, namely phonemic awareness and phonics, learned in their initial teacher education course.

This project is supported by Flinders University, College of Education, Psychology and Social Work

Purpose of the study

This project aims to seek feedback from professionals in the fields of speech and language pathology, psychology, educational academics, and in-service teachers to enhance the validity and usability of the newly developed online professional learning program.

What will I be asked to do?

You are invited to participate in a survey that will seek your advice on the validity and usability of the content within eight modules of the online professional program. Participation is entirely voluntary. Each of the eight modules were designed to take approximately 30 minutes to complete per week. The survey will take approximately 30 minutes to complete after you have sighted the modules' content.

What benefit will I gain from being involved in this study?

The sharing of your professional opinion will aid in supporting initial teacher education students who participate in the program in the future to access a valuable and usable tool to supplement their understanding and skills of scientific knowledge on how best to teach and assess reading at the word level.

Will I be identifiable by being involved in this study?

We do not need your name and you will be anonymous. Any identifying information will be removed, and your comments will not be linked directly to you. All information and results obtained in this study will be stored in a secure way, with access restricted to relevant researchers.

Are there any risks or discomforts if I am involved?

The researcher anticipates no risks from your involvement in this study, however, if you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher. The researcher anticipates that your time is the only burden placed upon you by participating in this study.

How do I agree to participate?

Participation is voluntary. You may answer 'no comment' or refuse to answer any questions, and you are free to withdraw from the study at any time without effect or

consequences. A consent form accompanies this information sheet. If you agree to participate please read and sign the form and send it back to me at:

Flinders University,

College of Education, Psychology, and Social Work,

Education Building (5.55)

GPO Box 2100, Adelaide 5001, South Australia

How will I receive feedback?

On project completion, outcomes of the project will be given to all participants via email.

Thank you for taking the time to read this information sheet, and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee in South Australia (Project number 8405). For queries regarding the ethics approval of this project, or to discuss any concerns or complaints, please contact the Executive Officer of the committee via telephone on +61 8 8201 3116 or email human.researchethics@flinders.edu.au

Appendix L Consent Form

CONSENT FORM FOR PARTICIPATION IN RESEARCH

(by speech and language pathologists, psychologists, academics, teachers, and pre-service teachers)

'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'

I ….....

being over the age of 18 years hereby consent to participate as requested in the …… for the research project on …….

1. I have read the information provided.
2. Details of procedures and any risks have been explained to my satisfaction.
3. I am aware that I should retain a copy of the Information Sheet and Consent Form for future reference.
4. I understand that: I may not directly benefit from taking part in this research.
   - Participation is entirely voluntary and I am free to withdraw from the project at any time; and am free to decline to answer particular questions.
   - While the information gained in this study will be published as explained, my participation will be anonymous and my individual information will remain confidential.
   - Whether I participate or not, or withdraw after participating, will have no effect on my progress in my course of study, or results gained.
5. I understand that only the researchers on this project will have access to my research data and raw results; unless I explicitly provide consent for it to be shared with other parties
6. I have had the opportunity to discuss taking part in this research with a family member or friend.

Participant's signature……Date……...

I certify that I have explained the study to the volunteer and consider that she/he understands what is involved and freely consents to participation.

Researcher's name…….....

Researcher's signature……..Date…….

Principle Supervisor's name …….....

Principle Supervisor's signature……Date…….

NB: Two signed copies should be obtained. The copy retained by the researcher may then be used for authorisation of Item 8 as appropriate.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee in South Australia (Project number 8405). For queries regarding the ethics approval of this project, or to discuss any concerns or complaints, please contact the Executive Officer of the committee via telephone on +61 8 8201 3116 or email human.researchethics@flinders.edu.au

Appendix M Ethics Approval

CONDITIONAL APPROVAL RESPONSE

For Review by SBREC Chair between Meetings

Submission Instructions	Note
a) Submit a single PDF version of your conditional approval response (including all attachments) to the SBREC Executive Officer at human.researchethics@flinders.edu.au. b) You do not need to: - submit an amended version of your application; or - submit a hard-copy as well as electronic copy	Response time Committee response will be emailed to you in ~10 working days Need Help? If you would like to talk to someone about how to respond to the conditional approval notice, feel free to call one of the Executive Officers (Ms Andrea Mather – 8201-3116 | or Ms Rae Tyler – 8201-7938)

Section A	Project Information

Project No.	**8405**
Project Title	Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.

Principal Researcher	Kelly Neumann	Email address:	neum0025@flinders.edu.au
		Telephone No.	

Section B	Response to Committee

1	Project Title (item A1) Please clarify the project title for this research study. The Sub-Committee notes there are 2 different titles provided within the ethics application. Section 1 – Cover page, Information Sheet and Consent Form: '*Collecting expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction'* Item A1 – ethics application: '*Pilot testing an online professional learning program designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction'*

Researcher's response

Item A1. Project title was incorrect. The correct title of the project is '*Collecting expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction'*

2	Contact and Recruitment (item D4b) Under item C5 (Research Method) and item D4b (Contact and Recruitment) states recruitment will be via email. Under item D4a (Conflict of Interest – Kelly Neumann) it states Ms Neumann will approach potential participants directly. Please clarify the contact and recruitment of potential participants for this research study.

Researcher's response

Participants will be contacted and recruited via email only.

3	Verbal Script (item D4c) See point 2 above. If applicable, please provide a verbal script of what will be said to participants during contact and recruitment. The committee recognises that a verbal script cannot predict all the possible responses or questions from potential participants and does not expect that the researcher will read directly from it during interaction with participants as this would impede open and natural communication. The verbal script should be an explanation of the key points that will be communicated to participants during contact and recruitment so that the Committee can be confident that participants will receive a complete picture of what the research entails to ensure that informed consent can be provided (see Chapter 2.2. under General Requirements for Consent and 5.2.16 under Participants' Interests in the *National Statement on Ethical Conduct in Human Research*

Researcher's response

No verbal script applicable as the participants will be contacted and recruited via email only.

4	Email Text (item D4d) Please revise the email text by including a sentence which explains this research project is a Flinders University student project, and is phrased as an invitation for them to participate in the project through filling out a short survey. Participates are invited to review the attached details. - Please submit a revised version of the email text.

Researcher's response

An amended email text as follows:

Dear ….

Flinders University are inviting volunteers from the professions of Speech and Language Pathology, Psychology, Academics, Registered Teachers, and Pre-service Teachers to participate in a research project conducted by a Masters of Special Education student titled 'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'

Volunteers will be asked to sight and provide feedback of an online course designed to supplement pre-service teachers' understandings and skill of assessment and instruction of foundational reading skills namely phonological awareness and phonics by filling out a short survey. Willing participants are invited to review the attached details for further details.

5	Participant Documentation – Letter of Introduction and Information Sheet (Attachment) Please revise participant documentation (ie, Letter of Introduction and Information Sheet) ensuring the correct time commitment (ie, as noted under item D10) is provided to potential participants (ie, the full time commitment which includes the review of documents and the survey). The Sub-Committee notes that within the Letter of Introduction the time commitment stated is '…no longer than 30 minutes of your time in total'. The Information Sheet states only the time commitment for the survey. Please submit revised versions of the Letter of Introduction and Information Sheet. (Please ensure the correct project title is listed on the Information Sheet – see point 1 above).

Researcher's response

The title has been checked

6	Consent Form Please revise dot point 4.3 by adding the following: (relevant for student participants). Please submit a revised version of the Consent Form. (Please ensure the correct project title is listed on the Consent Form – see point 1 above).

Researcher's response

Consent form relevant for student participants attached to this email

7	Survey (Attachment) The Sub-Committee queries if the timing of the survey has been tested, as they are concerned it could take more than 30 minutes to complete. Please comment.

Researcher's response

Overtype response here

8	Permissions (item D8) Please provide copies of correspondence granting permission to conduct the research from the individuals and/or organisations outlined (Kerri Bassiker topic Co-ordinator EDUC 2820 and Mike Nicolls Dean of Education, College of Education, Psychology & Social Work). Please ensure that all correspondence clearly outlines the specifics of what permission is being granted. If the documentation cannot be provided at the time of response to conditional approval please confirm that it will be provided to the Sub-Committee on receipt. Please note that data collection cannot commence until all relevant permissions have been granted.

Researcher's response

Dear Kerri Bassiker

I am a Masters of Special Education student whom would like permission to seek volunteers from within your topic EDUC 2820 for my research project titled 'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction'. This project is specifically suited to this cohort of final year students as they are the target users if this project is further advanced in the future as it is linked directly to AITSL's Australian Professional Standards for Teachers.

It is intended that user feedback will be sought during the third term of 2019, prior to your students commencing their final professional placement.

I look forward to your reply.

Warm regards

Kelly Neumann

Dear Mike Nicolls

I am a Masters of Special Education student whom would like permission to seek volunteers from within topic EDUC 2820 co-ordinated by Kerri Bassiker for my research project titled 'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction'. This project is specifically suited to this cohort of final year students as they are the target users if this project is further advanced in the future as it is linked directly to AITSL's Australian Professional Standards for Teachers.

It is intended that user feedback will be sought during the third term of 2019, prior to these students commencing their final professional placement.

I look forward to your reply.

Warm regards

Kelly Neumann

9	Signatures (item H) Please provide a completed and signed copy of the Application Certification and Signature Page which is available for download from the Guidelines, Forms and Templates SBREC web page.

Researcher's response

A copy of a completed Application Certification and Signature Page is attached to this email.

Section C	Signatures – Student Projects ONLY

Student Researcher

I, whose signature appears below, confirm that my supervisor has reviewed my conditional approval response before submission to the committee.

Students Full Name:	Kelly Neumann	**Date: 17/07/2019**
Students Signature:		

Student Supervisor

I, whose signature appears below, confirm that I have reviewed the conditional approval response prepared by the student researcher under my supervision.

Supervisors Full Name:	Karyn carson	**Date: 17/07/2019**

Supervisors Signature:		

STAFF Projects

Please note that conditional approval responses for staff projects DO NOT need to be signed.

PLEASE NOTE: conditional approval responses will not be submitted to the Chairperson for review unless / until this form has been signed by the student's supervisor.

Appendix N Email Script: how to access to the on-line program and the survey

Dear

Thank you for volunteering to participate in the research project titled *'Collating expert and user feedback to inform the refinement of an online professional learning course designed to support preservice teachers' phonological awareness and phonics knowledge, self-efficacy, and understanding of evidence-based reading instruction.'*

Please use the following URL to access the on-line course

https://neum0025.moodlecloud.com/login/index.php

User Name: neum0025

Password: neum8405

Please note that this is an administrator version of the course, if the quiz sections look partially complete please click 'start a new preview.'

Please return the completed survey by email to neum0025@flinders.edu.au by September the 13th 2019.

Warm regards

Kelly Neumann

Appendix O Survey Tool

SURVEY

(for *speech and language pathologists, psychologists, academics, teachers, and pre-service teachers*)

1. Please rate the appropriateness of the following features content, appearance, usability and credibility by selecting one of the five options:

a) Quantity of content

certainly disagree	disagree	neutral	agree	certainly agree

Comments

b) Pace of content

certainly disagree	disagree	neutral	agree	certainly agree

Comments

c) Balance of reading and viewing

certainly disagree	disagree	neutral	agree	certainly agree

Comments

d) Obvious navigation and icons

certainly disagree	disagree	neutral	agree	certainly agree

Comments

e) Simple language, wording and terminology

certainly disagree	disagree	neutral	agree	certainly agree

Comments

f) Practical activities

certainly disagree	disagree	neutral	agree	certainly agree

Comments

g) Printable resources

certainly disagree	disagree	neutral	agree	certainly agree

Comments

h) Links to other websites

certainly disagree	disagree	neutral	agree	certainly agree

Comments

i) Sources of evidence and references

certainly disagree	disagree	neutral	agree	certainly agree

Comments

j) Linguistic activities

certainly disagree	disagree	neutral	agree	certainly agree

Comments

k) Video files (eg. expert advice, instruction samples, personal anecdotes)

certainly disagree	disagree	neutral	agree	certainly agree

Comments

l) Diagrams/tables

certainly disagree	disagree	neutral	agree	certainly agree

Comments

m) Case studies

certainly disagree	disagree	neutral	agree	certainly agree

Comments

n) Discussion opportunities

certainly disagree	disagree	neutral	agree	certainly agree

Comments

2. Please provide comments of your responses in as much detail as possible:

Comments

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee in South Australia (Project number 8405). For queries regarding the ethics approval of this project, or to discuss any concerns or complaints, please contact the Executive Officer of the committee via telephone on +61 8 8201 3116 or email human.researchethics@flinders.edu.au