

Trinity College Dublin, The University of Dublin

A Sound Beginning for Reading:
The impact of a phonological awareness programme on junior infant children
attending a DEIS urban Band 1 school

A thesis written in fulfilment of the requirements for the degree of
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Declaration

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Summary

Phonemic awareness – ‘the conscious awareness that spoken words are made up of individual speech sounds’ (Walsh, 2009) – is an important prerequisite for later reading proficiency, as it acts as a bridge between spoken language and written language. Gray and McCutchen (2006) contend that children who are better at identifying sounds within spoken words can, more easily, map letters onto those sounds when introduced to print. Since the 1980s, there has been a strong interest in the role of phonemic awareness in early reading development, with research repeatedly demonstrating a significant relationship between a child’s phonemic awareness and their future reading success (Adams, 1990; Ball & Blachman, 1991; Bradley & Bryant, 1983; Bryant et al., 1990; Carroll & Snowling, 2004; Carson, Gillon, & Boustead, 2011; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow, Burns, & Griffin, 1998; Storch & Whitehurst, 2002).

There is evidence to suggest that a child’s social background can affect his/her level of phonemic awareness (McIntosh, Crosbie, Holm, & Dodd, 2007; Nancollis, Lawrie, & Dodd, 2005). In an Irish context, national assessments of English reading (2009, 2014) have reported that the reading levels of children attending designated-disadvantaged schools are far below those of their peers attending more affluent schools. The current research provided an explicit and systematic phonological awareness programme, focused at the crucial phoneme level, to children attending a designated-disadvantaged school (DEIS), in an attempt to improve their phonemic awareness skills.

The research consisted of two studies. Study One involved the assessment of one-hundred-and-seven junior infant children in two primary schools (one of which served an area of socioeconomic disadvantage). The researcher wished to establish whether socioeconomic background had an impact on Irish children’s levels of phonemic

awareness as they began their first year of primary school. An iPad-based phonemic awareness assessment tool, created by the researcher, was utilised to assess the children's phonemic awareness skills. The findings of this study demonstrated that children from lower socioeconomic backgrounds begin school with lower levels of phonemic awareness, in particular, when assessed on tasks such as initial phoneme identity.

In Study Two, an explicit and systematic phonological awareness programme, focused at the crucial phoneme level, was created by the researcher and implemented in junior infant classes in a designated-disadvantaged school. The programme was short-term in duration and ran for fourteen weeks. The children were assessed at three intervals during their first year in school using the same iPad-based phonemic awareness tool as Study One. The findings of Study Two indicated that the introduction of an explicit and systematic phonological awareness programme, focused at the crucial phoneme level, did allow children in the experimental group to achieve higher scores, in some cases significantly higher scores, when compared to children from the control group.

It is envisioned that findings from this research might be used to influence policy makers to examine preventive phonological awareness programmes when targeting young children's early reading development. At present, the focus in designated-disadvantaged schools is on remediating children's reading difficulties; however, instruction in phonemic awareness skills has the potential to identify children who may present with reading difficulties before formal reading has begun. The researcher contends that the phonological awareness programme designed as part of this research should be implemented in designated-disadvantaged schools across the country as a matter of urgency. It is also hoped that the iPad-based phonemic awareness tool, designed as part of this research, could potentially provide teachers with a time-efficient tool for the assessment and monitoring of young children's phonemic awareness skills.

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Definitions of Key Terms

Term	Definition
Alphabetic principle	The concept that for languages that use an alphabetic orthography, the written graphemes correspond to the phonemes of spoken words.
Decoding	The process of applying one's knowledge of the correspondences between graphemes and phonemes to determine the pronunciation, and hence the identity, of a word represented by a particular letter sequence.
Emergent literacy	The skills, knowledge, and attitudes that are presumed to be developmental precursors to conventional forms of reading and writing. (Whitehurst & Lonigan, 2001)
Graphemes	The basic elements of a writing system that are combined to represent the oral language.
Metalinguistics	The ability to reflect consciously on the nature of language.
Onset and rime	Within a syllable (eg. big), the portion preceding the vowel is called the onset (/b/), and the remainder of the syllable is called the rime (/ig/). The rime /ig/ can be further subdivided into two parts: the vowel /i/ and the final coda /g/.
Orthography	The writing (spelling) system of a language (ie. the way an oral language is represented by visual symbols).
Phoneme	The smallest units into which speech can be divided, and that make a difference to the meaning of a word. By convention, in phonemic transcription slashes are used to enclose the series of symbols that represent the phonemes, eg. /k/
Phoneme blending	Putting together phonemes that are presented separately.
Phoneme categorisation	Matching words according to whether they have speech elements in common.
Phoneme manipulation	Altering the pronunciation of a word by adding, subtracting or rearranging phonemes.
Phoneme segmentation	Breaking a spoken word into component phonemes.
Phonemic awareness	The conscious awareness that spoken words are made up of individual speech sounds [...and] represents the pinnacle of phonological awareness development (Walsh, 2009).
Phonemic awareness skills	The ability to blend or break up spoken words into component individual sounds (Walsh, 2009).
Phonics	An approach to, or type of, reading instruction that is intended to promote the discovery and understanding of the alphabetic principle, the correspondences between phonemes and graphemes, and phonological decoding.
Phonology	The domain of language that pertains to the elements of speech and the systems that govern the structural relationships among these elements.

Phonological awareness	The broad class of skills that involve attending to, thinking about, and intentionally manipulating the phonological aspects of spoken language.
Phonological awareness training	Instruction and activities aimed at promoting children's awareness of the phonological structure of spoken language, especially of phonemes.
Syllable	A speech unit consisting of a vowel that can be preceded and/or followed by a consonant or a consonant cluster. One-syllable words are termed monosyllabic and words with more than one syllable are multisyllabic.

Note: All definitions (unless otherwise stated) referenced to Scarborough and Brady (2002)

Abbreviations

Com-PASMA	Computer-based Phonological Awareness Screening and Monitoring Assessment
CVC	Consonant-vowel-consonant
DEIS	Delivering Equality of Opportunity in Schools programme
DES	Department of Education and Skills
EL	Emergent Literacy
NA	National Assessment
NAERM	National Assessment in English Reading and Mathematics
NCCA	National Council for Curriculum and Assessment
NELP	National Early Literacy Panel
Non-DEIS	Schools not allocated disadvantaged status
NRP	National Reading Panel
OECD	Organisation for Economic Cooperation and Development
PISA	Programme for International Student Assessment
PIRLS	Progress in Reading Literacy Study
SEF	School Excellence Fund
SES	Socioeconomic Status

1.0 Introduction

The reading skills acquired by children in the early years of education provide a crucial foundation for later reading ability. Longitudinal research studies have documented a strong relationship between the literacy skills that children enter school with and the later academic performance of these children (Juel, 1988; Stanovich, 1986; Storch & Whitehurst, 2002). The significance of improving children's reading ability cannot be overstated, as Stromquist (2005) highlights 'literacy skills are fundamental to informed decision-making, personal empowerment, active participation in local and global social community' (p. 12). While the majority of children develop reading skills without problems, an estimated twenty-five percent of children experience significant difficulties in learning to read (Adams, 1990). These early reading difficulties have been associated to ongoing reading problems throughout formal school and even continue into adulthood (Bruck, 1998).

In 2002, the National Early Literacy Panel (NELP) was convened in the United States to identify the early literacy skills and abilities that could be considered as precursors to later literacy achievement. The panel conducted a meta-analysis of the scientific research available on the development of early literacy skills and its findings were documented in the report *Developing Early Literacy* (2008). The NELP identified six literacy-related variables that consistently predicted later literacy outcomes. These variables included alphabet knowledge, phonological awareness, rapid naming of letters and digits, rapid naming of objects and colours, writing or writing one's own name, and phonological short-term memory. The panel also reported that code-focused instruction, such as instruction in phonological awareness, consistently demonstrated positive effects directly on children's later reading skills. In the National Council for Curriculum and Assessment (NCCA) commissioned report, *Literacy in Early Childhood and Primary*

Education (3-8 years), Kennedy et al. (2012) report that research on reading development confirms that ‘the two clusters of oral language abilities – phonological awareness on the one hand and generic language abilities on the other – are predictive of later reading ability’ (p. 293).

One group of children who consistently report as demonstrating lower levels of reading ability are children from socioeconomically disadvantaged backgrounds (Burt, Holm, & Dodd, 1999; Dodd & Carr, 2003; Gillon, Moran, Hamilton, Zens, Byrne & Smith 2007; Hecht, Burgess, Torgesen, Wagner, & Rashotte, 2000; Locke, Ginsborg, & Peers, 2002; Lonigan, 2003; Lonigan, Burgess, Anthony, & Barker, 1998 McIntosh, Crosbie, Holm, & Dodd, 2007; Torgesen et al., 1994; Whitehurst, 1997). The research presented in this dissertation focuses on this group of children and examines one of the variables identified by the NELP (2008), phonological awareness, and, in particular, a subset of phonological awareness referred to as phonemic awareness, the ability to identify the individual sounds in spoken words. Research conducted by Foorman and Torgesen (2001) demonstrates that children who present as ‘at-risk’ of experiencing future reading difficulties require more explicit, more intensive, and more scaffolded instruction than their peers who do not exhibit such difficulties. Therefore, the research conducted in this dissertation investigates whether the implementation of an explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, has the potential to improve the phonemic awareness skills of children attending a school in an area of socioeconomic disadvantage so as to contribute to reducing the gap in reading abilities between those who attend designated disadvantaged schools in Ireland and those who do not. To date, there is no research evidence on the implementation of phonological and/or phonemic awareness programmes available in an Irish context; consequently, for the purposes of this dissertation, the researcher draws on research from international studies. Such studies have shown that explicit instruction in the area of phonemic

awareness can be implemented to successfully develop children's phonemic awareness skills which, in turn, improves later reading skills such as decoding (Ball & Blachman, 1991; Bryant, Maclean, & Bradley, 1990; Byrne & Fielding-Barnsley, 1991, 1993, 1995; Carroll & Snowling, 2004; Carson, Gillon & Boustead, 2013; Cunningham, 1990; Ehri, Nunes, Willows, & Schuster, 2001; Gillon, 2004; Lonigan, 2003; Storch & Whitehurst, 2002; Torgesen, Wagner & Rashotte, 1994).

1.1 Context of the Study

Since the 1990s, in Ireland, government policy addressing educational disadvantage has centred on providing additional resources and supports to schools serving disadvantaged populations. The *Delivering Equality of Opportunity in Schools* (DEIS) programme was introduced in 2005 to bring together a number of earlier stand-alone schemes that addressed specific aspects of educational disadvantage. In 2005, primary schools serving areas of high levels of socioeconomic disadvantage were identified for inclusion in DEIS. DEIS differed from its predecessors in that it had a greater focus on activities designed to improve literacy and numeracy levels in schools. Urban schools under DEIS are currently divided into two 'bands', depending on their assessed level of disadvantage. Band 1 schools serve areas where socioeconomic disadvantage is most apparent, while Band 2 schools serve areas regarded as less socioeconomically disadvantaged than Band 1 but disadvantaged nonetheless. Furthermore, DEIS schools are categorised as either rural or urban.

Resource allocation under DEIS varies for schools identified as Band 1 or Band 2, with more intensive resources allocated to Band 1 schools. Since 2012/13, Band 1 schools have been permitted to operate with class sizes up to a maximum of 20 children in schools with junior classes, 24 children in schools with senior classes, and 22 children in vertical schools (schools with junior and senior classes). The primary school at the centre of the current research is identified as a DEIS urban Band 1 school. (Please note, that for the

purpose of this dissertation, schools that are not designated as disadvantaged will be referred to as ‘non-DEIS schools’.)

1.2 Rationale for the Research

Information on national standards in reading are collected periodically in Ireland and achievement in reading in primary schools has been monitored in a series of national assessments (NA) since 1972. At regular intervals (typically every five years or so), the English reading achievement of primary school children is assessed. These assessments have been administered to various class levels on different testing occasions. For example, in 2004, English reading achievement was assessed at first class and fifth class levels (Eivers, Shiel, Perkins, & Cosgrove, 2005), and comparisons were made with achievement outcomes in the NA 1998 (Cosgrove, Kellaghan, Forde, & Morgan, 2000), which was administered at Fifth class. Recent implementation of this reading assessment in 2014 revealed that there were significant increases in mean achievement scores between the NA 2009 (Eivers, Close, Shiel, Millar, Clerkin, Gileece, and Kiniry, 2010) and NA 2014 (Shiel, Kavanagh & Millar, 2014). These increases represent the first significant increases in average reading performance nationally since NA 1980 was conducted.

These increases coincided with the introduction of the *Literacy and Numeracy for Learning and Life: The National Strategy to Improve Literacy and Numeracy among Children and Young People (2001-2020)* (DES, 2011). This national strategy set out ambitious targets for improving literacy and numeracy in Ireland and outlined how better literacy and numeracy for individuals contributes to a more just and equitable society. Its five areas for immediate action (relating to literacy) were to increase the time allocation for literacy, improve professional development for teachers, improve arrangements for the assessment of children’s literacy achievement, improve arrangements for reporting children’s progress, and co-operate with the administration of national and international assessment studies.

However, despite recent improvements in national reading levels, the NA 2014 also highlighted that children attending DEIS urban Band 1 schools were continuing to demonstrate lower levels of reading ability when compared to their peers attending non-DEIS schools, particularly at or below level 1 in second and sixth classes respectively (see Table 1.1).

Literacy Levels	DEIS urban Band 1	Urban non-DEIS
2nd class At or below level 1	44%	19%
6th class At or below level 1	47%	22%

Table 1.1 Reading gap between DEIS and non-DEIS urban schools as reported in the National Assessment in Reading and Mathematics (2014)

This gap in reading ability between DEIS urban Band 1 schools and non-DEIS schools has been further recognised in the Irish government’s most recent policy document on tackling educational disadvantage, *DEIS Plan* (DES, 2017). In this most recent plan, discrete reading targets have been specifically set out for children attending DEIS urban Band 1 schools (see Chapter Two, Section 2.10). Consequently, the overall aim of this dissertation is to contribute to reducing the prevailing reading gap by introducing an explicit, teacher-led phonological awareness programme, focused at the crucial phoneme level, to junior infant children attending a DEIS urban Band 1 school.

1.3 The Components of Language

As human beings, our principal means of communication is through language. Linguists have identified five components of language: phonology, morphology, semantics, syntax, and pragmatics. Phonological awareness has its roots in phonology. The word ‘phonology’ is derived from the Greek morphemes ‘*phone*’, meaning ‘voice’, and ‘*logos*’, meaning ‘word’ or ‘speech’ (Nicholson, 1997). Phonology is the study of how speech sounds form patterns in relation to a particular language and, according to

Clark (2007), refers to the systematic use of sound to encode meaning in a spoken language. Phonological knowledge permits us to produce sounds that form meaningful utterances, recognize a foreign accent, make up new words, and know what is or is not a sound in one's own language.

Each of the components of language listed above are required to make use of language and are usually internalised with little explicit knowledge; however, in the transfer of spoken language to written language, the phonological component becomes more explicitly thought about and acted upon. Phonological awareness is, therefore, referred to as a metalinguistic skill (see Chapter Two, section 2.2.1) that is required when consciously reflecting on language and is necessary in the important transfer of spoken language to written language.

1.4 Spoken Language and Written Language

Reading is not a simple derivative of spoken language. Kamhi and Catts (2014) contend that, although spoken language and reading have a good deal in common in terms of the language components and processes required for both, there are also fundamental differences between the two. Human beings are biologically adapted to process spoken language and, consequently, they learn to speak and understand that language without explicit instruction. Research suggests that young children are equipped with an implicit and unconscious phonological knowledge that allows them to gain mastery of speaking and listening in their native language. Indeed, babies become attuned to the phonemes of their native language within the first few months of life (Adams, 1990). This implicit knowledge also allows a child to make judgements about whether a word is part of his/her native language; correct speech errors; and discriminate between acceptable and unacceptable variations of a spoken word (Yavas, 1998). As young children learn to talk, their primary interest resides in the meaning of the words they hear and speak.

Reading, however, is a relatively new human ability for which specific biological adaptation does not exist. As a child learns to read in an alphabetic language, such as English, s/he is required to draw upon a conscious phonological awareness. In her research, Liberman (1973) identified that reading an alphabetic language requires an explicit knowledge of the phonological aspects of speech. Such an awareness requires the child to analyse spoken words in a different way: to become aware that each word consists of a unique sequence of identifiable sounds and that these sounds are separate from the meaning of the word. Therefore, to read proficiently, children must gain an awareness of the structure of their oral language, both at the word and individual sound levels.

It is important to note, at this stage, that this dissertation refers to phonological awareness in the context of the English alphabetic language only.

1.5 What is Phonological Awareness?

Phonological awareness, or the sensitivity to the sounds of one's language, is a metalinguistic skill that requires children to attend to, think about and intentionally manipulate the sounds of spoken language (Scarborough & Brady, 2002). Phonological awareness is often described as encompassing a hierarchy of skills, ranging from basic skills, such as displaying an awareness of words in a spoken sentence, to more complex skills, such as blending, segmentation and manipulation of the individual units of sound in a word (Adams, 1990; Anthony, Lonigan, Burgess, Driscoll, Phillips, & Cantor, 2002; Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003; Blachman, 1994; Lane, Pullen, Eisele, & Jordan, 2002). These individual units of sound are referred to as phonemes.

Phonological awareness follows a developmental progression whereby children acquire an awareness of larger units of sound, such as words and syllables, before acquiring an awareness of smaller units, such as onset and rime, and, eventually, phonemes (Adams, 1990, Anthony et al., 2002; Bryant et al., 1990; Cassady, Smith, Bauserman,

Jordan, Walker, & Popplewell, 2002; Goswami & Bryant, 1990; Lonigan et al., 1998).

Figure 1.1 illustrates the developmental continuum of phonological awareness.

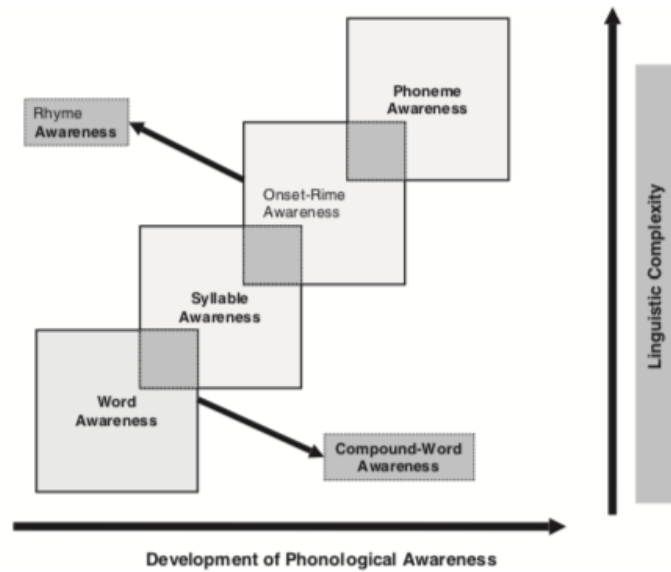


Figure 1.1 The developmental continuum of phonological awareness (Phillips, Clancy-Menchetti, & Lonigan, 2008)

As can be seen from Figure 1.1, phonemic awareness is a subset of phonological awareness and is considered the most complex phonological skill that children can acquire. Since the 1990s, phonemic awareness has received particular attention due to its causal relationship with later reading ability (Adams, 1990; Ball & Blachman, 1991; Bradley & Bryant, 1983; Bryant et al., 1990; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow, Burns, & Griffin, 1998; Storch & Whitehurst, 2002). The fact that it is recognised as a powerful predictor of children's future reading achievement (Adams, 1990; Carson, Boustead & Gillon, 2013; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002) has also attracted the attention of reading researchers.

Phonemic awareness specifically refers to the ability to manipulate and detect the *smallest* sound units in words, ie. phonemes. For example, a child is thought to demonstrate phonemic awareness if s/he can segment a spoken word, such as 'bat', into its

three individual phonemes, /b/, /a/, /t/ and blend individual phonemes together, such as /d/, /o/, /g/, to pronounce the word 'dog'. Despite the prominence of phonemic awareness in the field of reading research, the impact of socioeconomic background on children's levels of phonemic awareness has not received much attention. For the most part, phonemic awareness intervention studies have been focused on the area of special education.

1.6 Why is Phonological Awareness Important for Reading?

Word recognition is one of the basic skills developed by beginning readers when presented with a printed text (Adams, 1990; Ehri, 1998; Ziegler & Goswami, 2005). It is a broad term that refers to the process of determining a printed word's identity by any means. Word recognition can be achieved a number of ways: a reader can use their knowledge of letter-sound relationships to break a word into its component sounds and blend them back together to form a recognisable word (decoding); a reader can use the context of a sentence to 'guess' a word; a reader can use an accompanying picture to determine an unfamiliar word; and/or a reader can learn to recognise words in their entirety by sight.

Decoding is an aspect of word recognition that gets particular attention when a child is in the beginning stages of learning to read. It refers to a beginning reader's ability to recognise printed symbols, attribute a speech sound to those symbols, and blend those sounds together in a fluent manner to pronounce a word. This process is often referred to by teachers as 'sounding out' a printed word. Scarborough and Brady (2002) define decoding as 'the process of applying one's knowledge of the correspondences between graphemes (letters) and phonemes (individual sound units) to determine the pronunciation, and hence the identity, of the word represented by a particular letter sequence' (p. 324). Decoding enables children to read words they know but have never seen represented in print. In order to decode successfully, a child must have explicit knowledge and awareness of the phonological structure of spoken words, more specifically, the knowledge that

words consist of individual phonemic segments. This knowledge is referred to as phonemic awareness. Phonemic awareness is known to play a pivotal role in a child's ability to decode in the early stages of reading (Anthony & Lonigan, 2004; Bradley & Bryant, 1983; Byrne, 1998; Ehri et al., 2001; Hulme et al., 2002; Sprugevica & Hoiem, 2003; Torgesen, Wagner & Rashotte, 1994), as it aids the reader in attributing speech sounds to, otherwise arbitrary, meaningless symbols.

In alphabetic orthographies, such as English, written language represents spoken language at a phonological level (Lieberman & Shankweiler, 1991). Children's understanding that words are made up of smaller sounds, ie. phonemes, helps them to 'crack the code' of written language and understand the alphabetic principle. The alphabetic principle refers to the fact that written words represent spoken words in a sound-by-sound correspondence. When a teacher asks a child who is learning to read to 'sound out' an unknown word, this will only make sense if the child understands the concept that the word can be broken down into smaller components. A strong grasp of phonological awareness can help children to understand this concept.

Phonological awareness is not intuitive and often requires deliberate instruction and practice. This is particularly the case for phonemic awareness, as phonemes do not naturally exist in spoken language. However, over the past four decades, research has demonstrated that instruction in phonological awareness has a positive effect on a child's success with learning to read (Bus & Van Ijzendoorn, 1999; Ehri et al., 2001; Gillon, 2004; Perez, 2008; Troia, 1999). Therefore, providing instruction, particularly at the phoneme level, to promote children's phonological awareness skills, is important as these skills are considered precursors to, and strong predictors of, future reading success (Adams, 1990; Carson et al., 2013; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002). Consequently, although the programme implemented in this dissertation provides instruction in broader phonological awareness skills, such as word

awareness, syllable awareness and onset-rime awareness, the majority of the programme focuses on instruction at the crucial phoneme level.

1.7 Research Questions

The two studies conducted in this dissertation aim to address the following three research questions:

- 1. Do junior infant children from lower socioeconomic backgrounds begin primary school with lower levels of phonemic awareness?**

International research reports that children from lower socioeconomic backgrounds often begin formal schooling with lower levels of phonological awareness (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997).

- 2. Will the introduction of an explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, improve the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school, as evidenced by performance on assessments of phoneme identification, phoneme blending and phoneme segmentation skills?**

Research reports that explicit instruction in the area of phonemic awareness can be implemented successfully to develop children's phonemic awareness skills, which, in turn, improves subsequent reading abilities, such as decoding (Ball & Blachman, 1991; Bryant et al., 1990; Byrne & Fielding-Barnsley, 1991, 1993, 1995; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Storch & Whitehurst, 2002; Torgesen et al., 1994).

- 3. What are the characteristics of an effective phonological awareness programme implemented to positively affect junior infant children's phonemic awareness skills in a DEIS urban Band 1 school in Ireland?**

The third research question reflects the need for researchers who implement programmes to not only ask whether their programme has been successful but to also examine and identify ‘how’ and/or ‘why’ it has worked.

1.8 Overview of the Research

The research presented in this dissertation consists of two studies and adopted a pragmatic, mixed-methods research approach, which employed Educational Design Research (EDR) as its methodological design. In Study One, the phonemic awareness skills of one-hundred-and-seven junior infant children (DEIS urban Band 1 school (n=67) and a non-DEIS school (n=40)) were assessed during their first year of formal schooling. An iPad-based phonemic awareness assessment app was used to empirically measure the children’s phonemic awareness skills. The children were assessed in September, three weeks after formal schooling began. This first study was conducted to determine whether Irish children from socioeconomic disadvantaged backgrounds began school with lower levels of phonemic awareness, as reported in the international research (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997).

Study Two required classroom teachers, in a DEIS urban Band 1 school, to implement an explicit and systematic phonological awareness programme, focused at the crucial phoneme level, with junior infants children. The programme was short-term in duration and ran for 14 weeks between October and January. The teachers received professional development from the researcher in the areas of phonological and phonemic awareness prior to the implementation of the programme. The study consisted of a quasi-experimental, pre/post test design and incorporated a mixed-methods approach that involved collecting and analysing both quantitative and qualitative data. Similar to Study One, the children (n=67) were assessed using an iPad-based phonemic awareness assessment app and were assessed at three intervals during their first year of formal

schooling: September, January and June. This study was conducted with the aim of improving the phonemic awareness skills of children attending a DEIS urban Band 1 school in order to provide them with a strong foundation upon which to build future reading skills.

1.9 Overview of the Research Methodology

This research was conducted within a pragmatic epistemological paradigm and the methodological approach adopted was Educational Design Research. EDR has its philosophical underpinnings in pragmatism and focuses on the study of learning in authentic contexts through the design and study of instructional interventions/programmes (Brown, 1992; Collins, 1992). The ultimate goal of EDR is to develop evidence-based claims, emerging from naturalistic investigations, which result in knowledge about how people/children learn, in order to directly affect practice.

A mixed-methods approach was adopted with both quantitative and qualitative data collected and analysed. To examine the effectiveness of the phonological awareness programme, a quasi-experimental, pre-/post-test design was adopted. This research design is commonly used in educational research that attempts to test the efficacy of a particular intervention programme. Parametric statistical analysis was conducted using Statistical Package for Social Sciences (SPSS) (version 23.0). The qualitative research instruments employed included teacher logs, teacher monthly progress reports and a focus-group interview. Thematic analysis was conducted on the interview data and teacher logs to ascertain 'how' or 'why' the programme was successful for those implementing it. From this data analysis, key characteristics of an effective phonological awareness programme were identified. The findings of this pragmatic, mixed-methods, quasi-experimental research design are documented in Chapter Six.

1.10 Thesis Structure

This chapter is the first of eight in this dissertation and set out the background and rationale for the research. The three research questions that underpin this research were outlined and the chapter provided a general introduction to the topics under investigation: phonological awareness and educational disadvantage.

Chapter Two provides an exploration of the literature pertaining to phonological awareness. It examines the position of phonological awareness within an emergent literacy conceptual framework and outlines the developmental progression of phonological awareness, highlighting the position of phonemic awareness within that progression. Chapter Two describes seminal models of phonological awareness that have contributed to our understanding of the construct. The chapter also provides an overview of educational disadvantage and discusses the impact of educational disadvantage on children's literacy levels in Ireland. The chapter concludes with a description of literacy policies and practices that are ongoing in Ireland in an attempt to tackle educational disadvantage and improve literacy levels among young children from disadvantaged backgrounds.

Chapter Three begins by describing the research paradigm and research approach that informed the two studies undertaken in this dissertation. As EDR is an emerging research approach, a detailed description of its features, phases and outputs will be highlighted as well as the philosophical stance that supports it. Details of both Study One and Study Two are examined, detailing research design, participants and instruments utilised to gather data. A description of the manner in which both the quantitative and qualitative data were analysed is provided and ethical considerations are then discussed. Finally, the chapter concludes with a discussion in relation to the limitations of the research.

Chapter Four provides details of the assessment tool that was employed to measure the children's phonemic awareness skills in both studies. It outlines the range of tools

currently available to assess children's phonemic awareness skills and highlights the shortcomings of these existing tools. Following this, the chapter describes, in detail, a computer-based phonological awareness screening and monitoring assessment tool (Carson et al., 2011), which provided the basis for the iPad-based phonemic awareness assessment app that was created and implemented in the current research. The chapter concludes with a detailed explanation of the development of the iPad-based assessment tool by the researcher and discusses the piloting of the tool along with identifying the limitations of utilising such assessment tools.

Chapter Five describes, in detail, the explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, that was created by the researcher and implemented by classroom teachers to improve the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school. The chapter demonstrates how the programme was shaped using the three dominant phases of educational design research: analysis/exploration, design/construction and evaluation/reflection. The framework for designing the programme, Van den Akker's Curricular Spiderweb (2003), is described and the key characteristics of the programme are summarised.

Chapter Six outlines the findings of both studies. This chapter will be introduced in three sections. The first section highlights the findings from Study One and provides a brief discussion based on these findings. The subsequent section presents the findings from Study Two. These findings are also followed by a brief discussion. The third, and final, section of this chapter examines 'how' or 'why' the programme was or was not effective for those who implemented it. This final section will present the findings of the qualitative data to determine the characteristics of an effective phonological awareness programme, focused at the crucial phoneme level.

Chapter Seven provides a discussion in light of the findings presented in Chapter Six, while the dissertation concludes with Chapter Eight, which provides an overview of the contribution of this research to reading instruction, theories of phonemic awareness and educational disadvantage. This final chapter also discusses the implications of this research on national policy and concludes with a synopsis of opportunities for future research.

2.0 Literature Review

Literacy represents not only one of the most complex acts performed by humans but is also crucial to both educational outcomes and life chances for individual learners (Adams, 1990; Gillon, 2004; Moats, 2003; Neuman & Dickinson, 2002; Snow, Burns, & Griffin, 1998; Torgesen, 1998). The importance of children becoming proficient readers is an issue facing educational systems across the world. In an Irish context, the *National Strategy to Improve Literacy and Numeracy Among Children and Young People 2011-2020* (DES, 2011) highlights that a failure to develop literacy skills is not just ‘a loss for the individual: it is also an enormous loss for all of us in Irish society’ (p. 9). Therefore, reading failure has serious implications as children who do not learn to read effectively at primary level are more likely to leave school early, be unemployed or take up low-skilled jobs, have poorer physical health, and are more likely to end up in poverty or in our prisons (National Economic and Social Forum, 2009).

Learning to read begins early in a child’s development, long before they attend school, and the development of literacy skills in early childhood provides the foundation for a child’s future academic success. According to Snow et al. (1998), research findings demonstrate that quality literacy instruction in the early years of school is the ‘single best weapon against reading failure’ (p. 343). One group of children that persistently present with a higher risk of later reading difficulties are children from lower socioeconomic backgrounds (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997). In Ireland, recent national English reading assessments (NAERM, 2014) (Shiel, Kavanagh, & Millar, 2014) reported significant improvements in reading levels at primary level. These results were greeted with much celebration, as this was the first time in 30 years since significant improvements in reading were reported. However,

the NAERM 14 also highlighted the gap that still prevails in the reading levels of children attending DEIS urban Band 1 schools in comparison to their peers attending non-DEIS schools. The implications of this prevailing gap are significant. Stanovich (1986) states that the gap between poor readers and their more accomplished peers continues to widen, partly because remediating reading difficulties becomes increasingly challenging after third grade (Fletcher & Foorman, 1994; Lyon, 1985). Therefore, armed with this knowledge, the researcher of this dissertation contends that rather than remediating children's later reading difficulties, focus and attention should be placed on preventing reading difficulties in the first instance.

Over the past four decades, researchers have identified key emergent literacy skills that are highly predictive of later success in learning to read (Adams, 1990; Ehri et al., 2001; National Early Literacy Panel, 2008; Torgesen, 1998; Snow et al., 1998; Whitehurst & Lonigan, 1998, 2001). Phonological awareness has been identified as one of these key emergent literacy skills. Since the 1980s, there has been strong interest in the role that phonological awareness plays in early reading development, with research repeatedly demonstrating a significant and causal relationship between a child's phonological awareness and their future reading success (Adams, 1990; Ball & Blachman, 1991; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Hulme, Bowyer-Crane, Carroll, Duff & Snowling, 2012; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002). These research studies have also reported that children can benefit from explicit instruction in phonological awareness, and, the provision of such instruction can improve children's phonological awareness skills which, in turn, can lead to improvements in their later decoding skills.

This chapter begins by presenting the conceptual framework for this research: emergent literacy and locating phonological awareness within such a framework. Section 2.2 examines phonological awareness in detail, and presents definitions, developmental

models and the skills associated with phonological awareness. The most complex of the phonological awareness skills, phonemic awareness skills, are then explored, as these crucial skills are the focus of this research. Again, definitions are provided and the relationship between phonemic awareness and reading is explored. Section 2.9 explores educational disadvantage in Ireland and its impact on levels of literacy. It also reports on literacy interventions and initiatives that have been put in place in an attempt to combat the affects of educational disadvantage on children's literacy levels. The chapter concludes with an examination of the impact of educational disadvantage on children's phonological awareness skills and a number of international studies are referred to in this section.

2.1 Conceptual Framework: Emergent Literacy

Within the last three decades, research has demonstrated that the origins of reading develop well before a child starts formal schooling. This concept is referred to as 'emergent literacy' and was first coined by Marie Clay in the 1960s. Defined as 'the skills, knowledge, and attitudes that are presumed to be developmental precursors to conventional forms of reading and writing' (Whitehurst & Lonigan, 2001, p. 12), emergent literacy conceptualises itself as a developmental continuum, with its origins early in the life of the child. As emergent literacy comprises of a broad range of skills, it is the skills that relate specifically to emergent *reading* that will be explored in this dissertation. Typically, infants between approximately eight and twelve months who are read to regularly by their parents begin to show signs of emergent reading, from grabbing and mouthing books to hinging the covers and turning the pages. Other emergent reading behaviours that a very young child might display include the following:

- Recognising specific books by their cover
- Pretending to read books
- Understanding that books are handled in a particular way
- Commenting on characters in books

- Listening to stories being read and asking for stories to be read
- Distinguishing the difference between illustrations and writing in books
- Identifying signs and logos

Aistear: the Early Childhood Curriculum Framework (NCCA, 2009, p. 54) states that emergent literacy ‘is concerned with children developing a growing understanding of print and language as a foundation for reading and writing’. Interestingly, Ireland’s newly implemented *Primary Language Curriculum* (NCCA, 2016) aligns itself with the principles and methodologies of *Aistear* for junior and senior infants, recognising that many infant children are still within the emergent phase of their literacy development.

The emergent literacy perspective has challenged the long-held view that reading instruction should not be introduced until children reach an age of biological maturation, often referred to as ‘reading readiness’. Advocates of the ‘reading readiness’ approach supported the notion that children should not learn to read and write until they begin school. Consequently, educators were instructed to postpone the teaching of reading until children reached an age of mental readiness for reading (thought to be around six and a half years old). While waiting for a child’s ‘reading readiness’ to develop, ‘educators focused on nurturing that maturation through instruction in skills seen as prerequisites for reading’ (Tracey & Morrow, 2012, p.15). Such skills were often taught in isolation and in a drill-like fashion, and included auditory discrimination, visual discrimination and visual motor skills.

Unlike the ‘reading readiness’ approach, the emergent literacy perspective acknowledges literacy-related behaviours that occur prior to attending school as legitimate and important aspects of the developmental continuum of literacy (Bowman, Donovan, & Burns, 2001; Shonkoff & Phillips, 2000; Teale & Sulzby, 1986). In challenging the ‘reading readiness’ approach, Teale and Sulzby (1986) contest that ‘these [literacy-related] behaviours are no pre-anything... It is not reasonable to point to a time in a child’s life

when literacy begins. Rather ... we see children in the process of becoming literate, as the term emergent indicates.' (p. xix). Although researchers suggest that no clear boundary exists between prereading and reading, a distinction is often made between what are referred to as emergent literacy skills and conventional literacy skills. Emergent literacy skills are considered the basic building blocks of learning to read and write, and include skills such as oral language, concepts about print, environmental print, alphabet knowledge, phonological awareness, visual-perceptual skills, and pretend reading and writing (Phillips & Lonigan, 2005), while conventional literacy skills are considered to be 'real' reading and writing that follow the form, content and use of standard conventions. Children are generally introduced to more conventional literacy skills when formal schooling begins; however, it should be noted that children's literacy development between three and eight years of age can span both emergent and conventional literacy (Kennedy et al., 2012).

The emergent literacy perspective is rooted in two complementary approaches to child development: neo-Piagetian and neo-Vygotskian. The neo-Piagetian approach emphasises that young children are active participants in constructing their own learning and learn about literacy through their own attempts at reading and writing. Indeed, many parents of young children have dismayed as the walls of their house became a blank canvas for their child's first experimentation with early writing. The neo-Vygotskian perspective views children's literacy learning as a socio-cultural process. Emergent literacy skills, such as those mentioned above, are learned through social interaction and in social contexts in which literacy is valued. Through everyday social experiences, children learn about the functions and processes of reading and writing long before they become conventional readers and writers.

2.1.1 The Comprehensive Emergent Literacy Model. The conceptual framework of the research conducted in this dissertation is underpinned by the Comprehensive

Emergent Literacy Model (CELM) developed by Dr Leigh Rohde (2015). Like previous models of emergent literacy (Mason & Stewart, 1990; Whitehurst & Lonigan, 1998), this model identifies the three components of emergent literacy to be print awareness, phonological awareness and oral language; however, unlike previous models, which focused predominantly on the discrete skills (Mason & Stewart, 1990; Whitehurst & Lonigan, 1998) and the constructs underlying emergent literacy (Senechal, LeFevre, Smith-Chant, & Colton, 2001), Rohde's CELM goes beyond these to introduce three additional considerations. These considerations include the recognition that

- each component of emergent literacy has its own developmental sequence
- each component supports the development of other components
- the impact of the environment in which children live has an impact upon their emergent literacy.

Rohde's CELM (as seen in Figure 2.1) emphasises that each of the three identified components of emergent literacy – print awareness, phonological awareness and language – should support the development of other components as part of a 'holistic appreciation' (Rohde, 2015, p.4), while, at the same time, the model acknowledges that individual components are comprised of their own complex developmental sequences. Rohde's model explicitly emphasises emergent literacy as an interactive process rather than a series of individual components (Rohde, 2015). She states that 'there is not one clear path of EL [emergent literacy] development but rather a series of associated and concurrent experiences that result in the building of knowledge and skills related to literacy knowledge' (p. 3). This is illustrated in her model by the overlapping of components. Rohde contends, for example, that print awareness and phonological awareness intersect and, evidence of this can be seen in children's use of inventive spelling, which visibly demonstrates children's knowledge of the letter-sound relationship.

Rohde argues further that previous models of emergent literacy (Mason & Stewart, 1990; Senechal et al., 2001; Whitehurst & Lonigan, 1998) lacked *explicit* recognition of the importance of setting and context within which children learn emergent literacy skills. In her CELM, Rohde draws on the same three components of emergent literacy but sets them within environmental factors that affect how these components are learned. These environmental factors include culture, demographics and community.

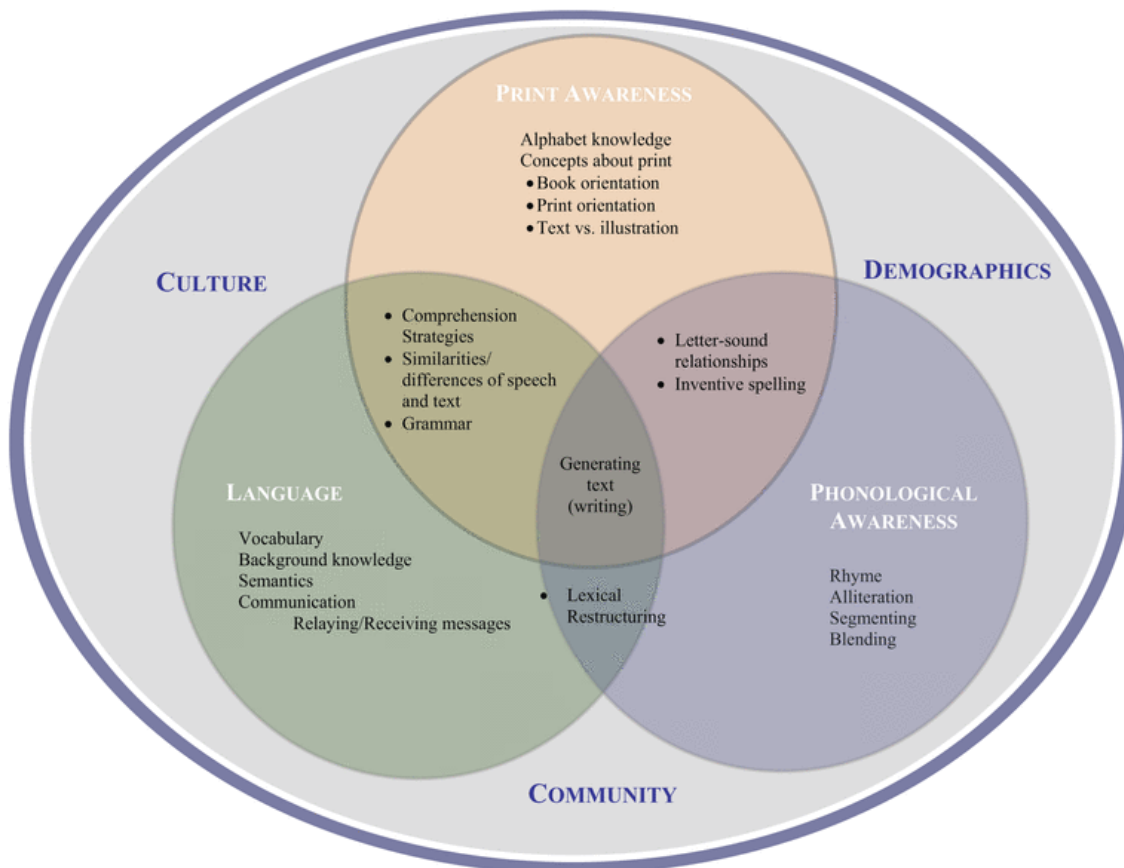


Figure 2.1 The Comprehensive Emergent Literacy Model (Rohde, 2015)

Rohde’s CELM (2015) emphasises that a child’s development of emergent literacy skills is influenced by environmental factors that dictate access to emergent literacy opportunities. These factors are considered to be either potential supports or barriers to young children’s development of emergent literacy. For example, a family that does not prioritise reading, is less likely to have a wide variety of children’s books and literacy-related materials in the home. Community refers to the impact that local government or

organisations can have on supporting emergent literacy initiatives within a community, eg. toddler story hour at the local library. Demographics reflect the background experiences and lifestyles of both children and their teachers.

Rohde's CELM (2015) contextualises this study in a number of important ways. Firstly, it highlights phonological awareness as a principle component of emergent literacy. Secondly, it emphasises the overlap or intersection between phonological awareness and print knowledge. This will be expanded upon further in section 2.4, when the relationship between phonemic awareness and reading will be explored. Finally, the model's attention to the influence of environment in children's emergent literacy learning is an important factor, as this study examines the impact, if any, of socioeconomic disadvantage on young children's development of phonemic awareness skills.

2.2 Phonological Awareness

Ever since Liberman proposed, in the 1970s, that one of the fundamental tasks facing beginning readers was recognising that speech could be segmented and that these segmented units could be represented by printed forms (Liberman, 1973), phonological awareness has been regarded as one of the keys to unlocking the complex process by which children learn to read (Adams, 1990; Blachman, 1997; Brady & Shankweiler, 1991; Goswami & Bryant, 1990; Stanovich, 1992; Wagner & Torgesen, 1987). Phonological awareness, simply stated, is an awareness of the phonological structure of spoken language. It asks young children to shift from focusing solely on the meaning of words to focus also on their underlying phonological structure. For example, it requires children who hear the word 'cat' to become aware that the word not only represents an animal that miaows and has whiskers, but also represents a word that comprises of one syllable and can be segmented into three phonemes, /c/, /a/, /t/. Developing such an awareness is crucial to beginning readers, because, in an alphabetic system such as English, beginning readers must use the alphabetic code to understand the link between speech sounds and

printed letters (Sulzby & Teale, 1991). In his research, Stanovich (1992) found that ‘children who begin school with little phonological awareness have trouble acquiring alphabetic coding skills and thus have difficulties recognising words’ (p. 281).

In the subsequent sections, phonological awareness will be examined in detail. The metalinguistic nature of phonological awareness will be explored and a working definition of phonological awareness will be provided. Models of phonological awareness that have informed our understanding of its developmental progression will also be described. Finally, in this section, the crucial role of phonological awareness, and more particularly, phonemic awareness, in learning to read will be highlighted.

2.2.1 Phonological awareness as a metalinguistic skill. The term ‘metalinguistic’ describes an awareness of language that is secure enough for individuals to talk about it (Herriman, 1991). Metalinguistic awareness applies to all of the components of language (see section 1.3) and is defined as ‘the ability to reflect on and manipulate the structural features of language’ (Nagy & Anderson, 1995, p.2). Downing (1979) suggests that for very young children, language is not an object of awareness in itself but is ‘seemingly like a glass, through which the child looks at the surrounding world, not suspecting that it has its own existence, its own aspects of construction.’ (p. 27). Consequently, if you were to ask a young child to explain the meaning of the word ‘boat’, they would have little trouble explaining what the word means; however, few children could identify the individual sounds that make up the word or indicate the sound they hear in the middle of the word. It is only as young children turn their attention to reading and writing that the component sounds in words take on a new significance. In order to learn to read, children need to become aware that the spoken word can be broken down into smaller linguistic units. This conscious, metalinguistic awareness is known as phonological awareness.

Learning to read is fundamentally metalinguistic. It requires individuals to treat language as an object of thought and to think about the structure of language. When

learning to read, children, firstly, need to become aware that speech can be represented by print and, secondly, they need to understand the manner in which print represents speech. Such a metalinguistic awareness can be measured through children's phonological awareness and their ability to identify and manipulate various linguistic units to include syllables, onset-rimes, and, ultimately, phonemes (Pufpaff, 2009).

2.2.2 Defining phonological awareness. A number of inconsistencies in the terminology used to describe the many phonological processes that exist have arisen in the research literature over the last four decades (Scarborough & Brady, 2002). Some researchers contend that the lack of a clear and accurate definition of phonological awareness has resulted in confusion regarding its role and importance in the reading process (Troia, 1999), and this may be one reason why teachers struggle to teach it in the classroom (Bos, Mather, Dickson, Podhajski, & Chard, 2001; Brady & Moats, 1997; Dickinson & Brady, 2005; Moats & Foorman, 2003; Phillips, Menchetti, Lonigan, & Farver, 2007; Zill & Resnick, 2006).

One of the possible reasons for the variability of definitions may be that studies in phonological awareness cross a number of disciplines, from psychology to education to linguistics to speech pathology. This has resulted in researchers sometimes misappropriating existing terms. A more problematic issue is the fact that the terms 'phonological awareness' and 'phonemic awareness' are, on occasion, used interchangeably by both researchers and educators (Sensenbaugh, 1996). Chard and Dickson (1999) state that many misconceptions about phonological awareness continue to persist, including the difference between phonological awareness, phonemic awareness, and phonics. In light of such confusion, it is critical, at this stage, to provide working definitions for both phonological awareness and phonemic awareness to ensure clarity for the remainder of the dissertation.

One of the debates that dominates the area of phonological awareness is whether it should be considered a conceptual understanding about language or a skill (Phillips & Torgesen, 2006). Many definitions of phonological awareness combine these two components together, which can muddy the water in relation to arriving at a clear understanding and definition. Some researchers have emphasised a necessity to define the conceptual understanding (awareness) separately from the skills when defining phonological awareness (Scarborough & Brady, 2002; Walsh, 2009).

For instance, part of what we mean by phonological awareness involves a skill that allows children to demonstrate that they are phonologically aware by, for example, segmenting a spoken word into its individual sounds or blending sounds together to make words. Therefore, a child's awareness of the phonological structure of a spoken word is reflected in his/her ability to do various things with speech sounds (Scarborough & Brady, 2002). Yet, to be able to segment or blend a word, children must first understand – or have an awareness – that there are sounds in words that can be manipulated.

In their paper, Scarborough and Brady (2002) focused on providing a common glossary for the 'phon' words, as they referred to them. They drew on the definitions used most widely by contemporary literacy scholars and requested eighteen experts – including leading reading researchers such as Ehri, Catts and Torgesen – to act as consultants to review the definitions arrived at for both accuracy and objectivity. Scarborough and Brady's definitions were chosen to define much of the terminology in the glossary of this dissertation. The definition arrived at for phonological awareness was that it consists of a broad class of skills, which involve **'attending to, thinking about, and intentionally manipulating the phonological aspects of spoken language, especially the internal phonological structure of words'** (Scarborough & Brady, 2002, p. 312). Scarborough and Brady went on to define the phonological awareness skills separately from this definition. The definitions of these skills will be provided later in section 2.2.6.

In her paper, Walsh (2009) contributed to the ‘conceptual understanding versus skill’ debate by treating the definition of phonemic awareness as a conceptual understanding separate from the skills. In effect, she argued that, especially within the field of education, there is a need to state what phonemic awareness is, and for that definition to be distinct from statements about how it is used. To this end, Walsh defined **phonemic awareness** as the ‘**conscious awareness that spoken words are made up of individual speech sounds [...and] represents the pinnacle of phonological awareness development**’ (p. 215). Walsh defined **phonemic awareness skills** as the ‘**ability to blend or break up spoken words into component individual sounds**’ (p. 215). Such skills include categorising and identifying sounds in words to higher levels of sound analysis, requiring children to delete or add a phoneme(s) to an existing word. Consequently, when discussing phonemic awareness, the researcher of this dissertation will define the term’s conceptual understanding as separate from phonemic awareness skills. In fact, it is the phonemic awareness skills, in particular, that are the focus of the research in this dissertation.

It is also important to emphasise, at this stage, that phonemic awareness is not the same as phonics. Phonics is an instructional approach to teaching the alphabetic principle, an understanding of the relationship between specific printed letter(s) and specific spoken sounds, whereas phonemic awareness focuses solely on speech sounds and does not involve the use of print. The next section identifies models of phonological awareness that have contributed significantly to our current understanding of how phonological awareness develops in children over time.

2.2.3 Models of phonological awareness development. One of the earliest models of phonological awareness development was proposed by Stanovich, Cunningham, & Cramer (1984). They administered ten phonological tasks to kindergarten children and, using a strong empirical approach, concluded there were three hierarchical levels in the

development of children's phonological awareness: the easiest level being rhyme, followed by phoneme segmentation and, finally, phoneme deletion. In 1988, Yopp, using the same ten tasks, concluded that there were, in fact, five developmental levels instead of the three proposed by Stanovich et al. In her study, Yopp provided much more specificity in the phoneme segmentation domain than Stanovich et al., by making a distinction between phoneme blending, phoneme isolation and phoneme segmentation tasks. In order of linguistic difficulty, Yopp's five developmental levels were rhyme, phoneme blending, phoneme isolation, phoneme segmentation, and phoneme deletion. While both of these seminal studies contributed greatly to our early understanding of the development of phonological awareness, both studies focused primarily on development at the phoneme level and gave little attention to other larger linguistic units, such as syllables and onset-rime.

Building on the earlier work of Stanovich et al. and Yopp, Adams (1990) presented a model that contended that between a child's awareness of rhyme and his/her awareness of phonemes, an awareness of syllables in words was possible. Based on her findings, Adams identified five developmental levels of phonological awareness. Adams' (1990) first linguistic level required that children develop 'an ear for the sounds of words' (p.80). Adams believed that this could be measured through children's knowledge of, and ability to remember, nursery rhymes. Her second linguistic level required children to master oddity tasks. In these tasks, children were asked to identify words that did not begin with the same sound as other words, or did not rhyme with other words. The third level involved children being able to blend syllables or phonemes; the fourth level required children to segment phonemes; and, finally, the fifth level involved phoneme manipulation (eg. the ability to add or delete phonemes in words).

These models of the development of phonological awareness highlighted the impact and significance of linguistic complexity on the development of children's

phonological awareness. Linguistic complexity refers to the progression from a sensitivity of larger linguistic units of sound (eg. words, syllables) to the smallest linguistic unit (eg. phoneme). Anthony and Lonigan (2004) contend that the linguistic complexity of phonological awareness skills ‘appears to parallel a hierarchical model of word structure, such that children are increasingly sensitive to smaller linguistic units’ (p. 44). Figure 2.2 illustrates the hierarchical model of word structure.

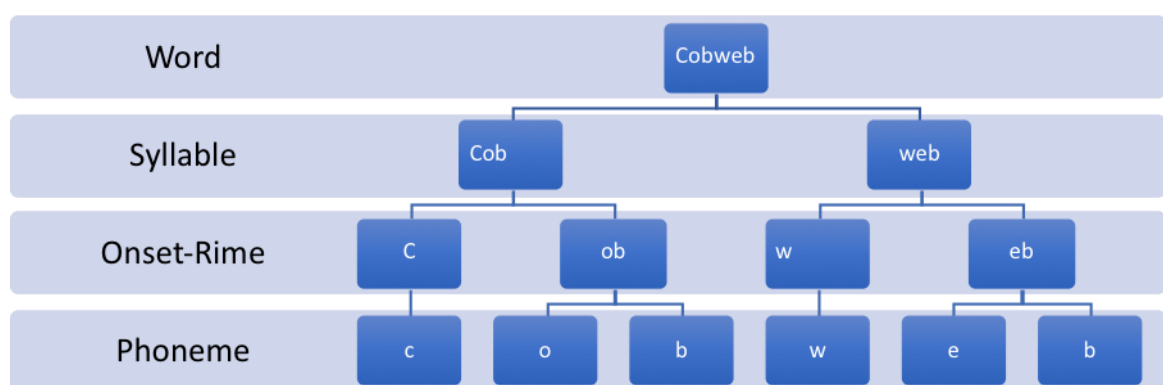


Figure 2.2 Hierarchy of word structure

One model of phonological awareness that placed a particular emphasis on linguistic complexity was Stahl and Murray’s (1994) model. Stahl and Murray replicated Yopp’s (1988) seminal work but reclassified her ten tasks based on levels of linguistic complexity. As a result of this reclassification, they produced a five-level model, which included the following linguistic hierarchy: recognising rhyme; manipulating onset-rime; manipulating vowel and coda; manipulating phonemes within onset clusters; and manipulating phonemes within coda clusters. This particular model emphasised the importance of the subsyllabic linguistic units – onset and rime – for the first time in the development of phonological awareness.

All of these previously mentioned models have contributed greatly to our understanding of the developmental progression of phonological awareness, particularly in relation to linguistic complexity, and emphasised that children develop an awareness of larger units of sound, such as words and syllables, before gradually developing an awareness of smaller units of sound, such as onset-rime and phonemes (Adams, 1990, Anthony et al., 2002; Bryant et al., 1990; Cassady et al., 2002; Goswami & Bryant, 1990; Lonigan et al., 1998). In 2008, Cassady, Smith and Putman examined the extensive literature relating to models of phonological awareness development and questioned whether the empirical and theoretical models proposed over time were essentially variations of a common developmental model. They attempted to integrate findings from existing models and utilised an assessment tool that examined discrete phonological awareness skills in an effort to create a model that would bridge the gaps in existing models. They included an assessment of phonological awareness that controlled for both linguistic complexity and task difficulty (see section 2.2.5). In their study, data was collected over two academic years, and kindergarten children were tested at three points during each year. From their findings, they concluded that phonological awareness development does develop in a systematic manner that is sensitive to both linguistic complexity and to the difficulty of phonological awareness tasks. Figure 2.3 presents Phillips, Clancy-Menchetti and Lonigan's (2008) visual representation of the development of phonological awareness as we currently understand it.

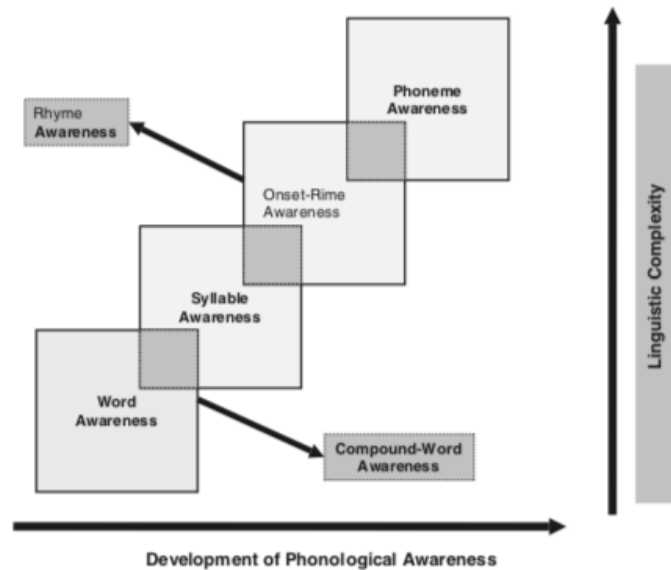


Figure 2.3 The developmental continuum of phonological awareness (Phillips, Clancy-Menchetti, & Lonigan, 2008)

The researcher of this dissertation concurs with Cassady et al. (2008) that the development of phonological awareness reflects the linguistic complexity of language and proceeds from word awareness to syllable awareness to onset-rime awareness to phonemic awareness. The skills associated with each of these levels of linguistic complexity will be presented in more detail in section 2.2.6.

2.2.4 The development of phonological awareness as a continuum. Although the development of phonological awareness is best represented as a continuum, research demonstrates that it does not follow a strict stage theory of development (Anthony et al., 2003). Studies have shown that children refine phonological awareness skills they have already acquired while they are learning new, more complex skills. In their research, Anthony et al. (2003) set out to examine the sequence of phonological awareness skills as they emerge within dimensions of linguistic complexity. From their research, they found that the development of phonological awareness is not a sequential-stage model in which children need to demonstrate mastery of one skill before beginning the next level. In their study of 947 two- to five-years-olds, they concluded that a ‘quasi-parallel’ relationship

exists between each phonological awareness skill, ie., as a child improves on a new skill, they also improve on the skill that went before it. From this they deduced that an overlapping of phonological awareness skills occurs. This is represented by the shaded areas in figure 2.3. This indicates that during classroom instruction in phonological awareness skills, the teacher does not necessarily need to wait for children to master ‘shallow’ phonological awareness skills (for example, syllable and onset/rime awareness) before providing instruction at the crucial phoneme level.

2.2.5 Phonological awareness skills and task complexity. Phonological awareness is a multilevel skill that requires the breaking down of words into smaller linguistic or phonological units. The linguistic units that will be discussed in the following sections include word awareness, syllable awareness, an awareness of onset and rime, and, ultimately, an awareness of the individual sounds in words (Gillon, 2004; Goswami & Bryant, 1990; Lonigan et al., 1998; Stanovich, 1992); however, before examining each of these skills, the issue of task complexity must be addressed, as this, along with linguistic complexity, impacts greatly upon the level of difficulty a child experiences when undertaking a phonological or phonemic awareness task.

In order to demonstrate proficiency in any of the phonological awareness skills, various tasks must be undertaken and completed by children. Yopp’s (1988) and Adams’ (1990) research demonstrated that the difficulty level of phonological awareness tasks can be influenced by the cognitive operations or the ‘task complexity’ required to complete them. Activities that require only one operation (eg. phoneme identification, where children identify the first or final phoneme in a word) represent a simple phonological awareness factor, while activities that required two operations, such as holding one operation in memory while a second operation is being performed (eg. identifying the first sound in ‘cat’ and changing that sound to a /p/), represented a compound phonological awareness factor. Tasks that encompass compound phonological awareness factors are

considered more difficult for children to complete. In line with Adams' (1990) and Yopp's (1988) findings, Cassady et al.'s (2008) research demonstrated that tasks that require children to blend sounds together generally precede tasks that required children to segment sounds. Therefore, from these studies, we can determine that a child will find phonological awareness tasks such as identification tasks easier to perform than tasks which require children to blend and segment sounds in spoken words. Accomplishing compound phonological awareness factor tasks, which require the manipulation of sound units, are deemed the most complex tasks for children to perform and include tasks such as deleting, adding and substituting sound units. Therefore, task complexity refers to the progression in difficulty from simpler phonological awareness tasks, such as identifying sounds in spoken words, to blending sounds, to segmenting sounds, and, finally, to the manipulation of sounds (see figure 2.4).

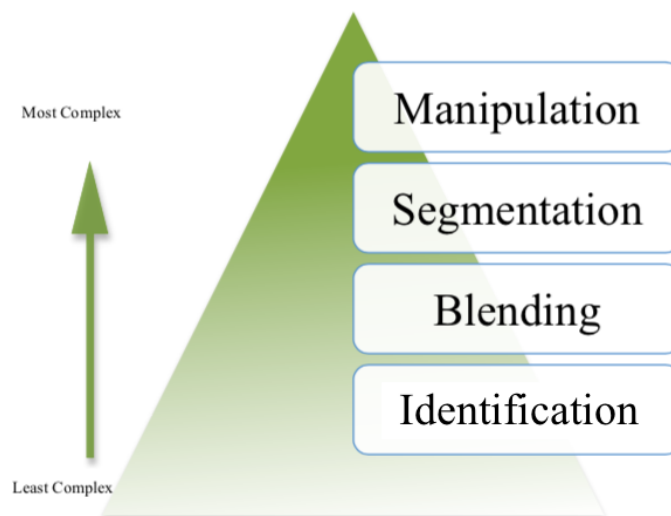


Figure 2.4 Task complexity of phonological awareness skills

2.2.5.1 Identification tasks. An identification task requires a child to group or match words according to whether they have speech elements in common (Scarborough & Brady, 2002). Typically, these types of tasks ask children to indicate which of several choices is the same as an identified target with regards to some speech component. For

example, the teacher may show a child three images, a pear, a coat and a dish, and ask the child to identify the image that begins with the same sound as 'cat'.

2.2.5.2 Blending tasks. Blending is the ability to combine a sequence of isolated syllables or phonemes together to produce a recognisable word (Torgesen, Morgan, & Davis, 1992). Sound blending reflects the abstract nature of reading (Ball, 1993; Moats, 2003) and is directly related to a child's ability to decode printed words (Catts, 1991; Moats, 2003). Blending tasks require a child to listen to a teacher/adult say the syllables, onset-rimes or the individual phonemes of a word very slowly. The child is asked to blend these sound units back together in order to identify the word. However, in her research Moats (2003) contends that children are not ready to begin blending phonemes in single syllable words until they have reached the age of five and a half.

2.2.5.3 Segmentation tasks. Segmentation is a phonological awareness task that refers to the explicit identification of individual syllables and/or phonemes in words (Torgesen et al, 1992). When children acquire this skill, they are able to analyse the components of a spoken word and pull it apart, or segment it, into syllables, onsets and rimes, or individual phonemes. However, as with phoneme blending, Moats (2003) reported that it is only when children have reached the age of five and a half to six years years of age that they are able to segment phonemes, as it is considered a very challenging skill for younger children. Phoneme segmentation is a skill that appears to be closely related to success in beginning reading (Ball, 1993; Stanovich, 1992; Yopp, 1988) and is also an important step in learning letter-sound correspondences (Catts, 1991; Moats, 2003).

2.2.5.4 Manipulation tasks. The manipulation of phonemes in a word is the most complex skill in terms of task complexity. Manipulation consists of either deleting, adding or substituting sound units at a syllable, onset-rime or phoneme level. According to Moats (2003), manipulation skills typically develop around seven years of age, and appear to evolve with the introduction of formal reading and spelling (Goswami, 2002).

Consequently, these tasks were not included in this study due to the age of junior infant children (typically four to five years of age).

2.2.6 Phonological awareness skills. This section examines, in more detail, the four phonological awareness skills that were included in the phonological awareness programme implemented in this dissertation: word awareness, syllable awareness, onset-rime awareness and phonemic awareness. The skills are presented in hierarchical order to reflect the linguistic complexity of each skill. Task complexity within each skill is also outlined.

2.2.6.1 Word awareness skills. An awareness of words in spoken language represents the most basic phonological awareness skill. Most children enter school with a good understanding that words form a spoken sentence. A sentence segmentation task is often administered to children to determine if they grasp the concept that speech is made up of sentences and that those sentences are, in turn, made up of words. For example, the teacher says a sentence such as ‘That is a dog.’ The children repeat the sentence and place one counter in a cup for every word they hear/say.

2.2.6.2 Syllable awareness skills. An awareness of the syllable unit is attained early as it is the easiest to detect (Goswami, 2002) due to each syllable unit having a salient peak of acoustic energy (Liberman, Shankweiler, Fischer, & Carter, 1974). Therefore, typically, syllables pose little difficulty for children as they are considered natural phonological units (Adams, 1990), and most young children show an awareness of how many beats or syllables there are in two- and three-syllable words. Through explicit instruction, children learn to blend syllables together to make words or segment words into syllables. Children can also be tasked with manipulating syllables by deleting a syllable from a word. When conducting syllable awareness activities in the classroom, it is useful to begin such work with the children’s own names and compound words before moving on to two-syllable, and later three- and four-syllable words. Table 2.1 illustrates the various

tasks (by level of complexity) that children are asked to complete to assess whether they have an awareness of sounds at the syllable level.

Levels of Task Complexity	Examples
Identification	How many syllables in the word 'cowboy'?
Blending	Put these syllables together: 'pup' – 'py'
Segmentation	Tell me the syllables you hear in this word: table Response: ('ta' – 'ble')
Manipulation (Deletion)	Say 'napkin' without the 'kin'
Manipulation (Substitution)	If I say the word 'suntan' and change the second syllable to 'flower', what is my new word?

Table 2.1 Syllable awareness skills and levels of task complexity

2.2.6.3 Onset and rime awareness skills. Onsets and rimes are linguistic units that are larger than a single phoneme but smaller than a syllable; therefore, these linguistic units are referred to as subsyllabic or intrasyllabic units. Monosyllabic words can be divided into two parts: the onset and the rime. The onset is made up of the parts of the syllable that come before the vowel; the rime is the vowel and all subsequent consonants. For example, in the word 'black', 'bl' is the onset, and 'ack' is the rime. All syllables have a rime, but not all have an onset; eg., the word 'at' has no onset. Typically, this level of awareness is measured through rhyming tasks because words rhyme when they share a common rime; eg., 'ack' words, and children can generate a number of rhyming words such as 'sack', 'back', 'rack', 'slack', etc. Table 2.2 illustrates the various tasks that children are asked to complete to ensure that they have an awareness at the onset-rime level.

Levels of Task Complexity	Examples
Onset-rime identification	Do these words rhyme: 'blame', 'dame'?
Onset-rime identification (Oddity task)	Which word does not rhyme: 'dog', 'mat', 'log'?
Onset-rime blending	Put this onset and rime together. What word do you hear? 'b' – 'at' Response: 'bat'
Onset-rime segmentation	Say the word 'log'. What is the rime of this word?
Onset-rime substitution	Tell me a word that rhymes with 'cat'?

Table 2.2 Onset-rime awareness skills and levels of task complexity

2.2.6.4 Phonemic awareness skills. This is the final level of phonological awareness and the highest phonological insight that a child can acquire. It asks children to tune in to the individual phonemes of a spoken word. As with syllable awareness and onset-rime awareness skills, children can demonstrate an awareness of sounds at the crucial phoneme level by completing a range of phonemic awareness tasks (see table 2.3).

Level of Task Complexity	Examples
Identification	What sound do you hear at the beginning of 'bug'? (/b/) What is the final sound in the word 'hat'? (/t/) What sound do you hear in the middle of the word 'dog'? (/o/)
Blending	Put these sounds together. What word do you hear? /s/ - /a/ - /t/
Segmentation	Tell me the sounds you hear in the word 'dog'. Response: (/d/ - /o/ - /g/)
Manipulation (Deletion)	Say 'meat' without the /m/ sound.
Manipulation (Substitution)	Say the word 'pan'. Now change the middle sound to /i/, what is my new word? Response: ('pin')

Table 2.3 Phonemic awareness skills and levels of task complexity

Note: Parallel lines surrounding a letter (/s/) are used to represent the sound rather than the name of letters.

2.2.6.5 Position of phonemes in words. As phonemic awareness skills are a particular focus of the research in this dissertation, consideration must be given to the position of phonemes in words, as this can affect a child's ability to identify, blend or

segment phonemes in words. An incidental, yet influential, finding of Stanovich et al.’s (1984) study (see previous section 2.2.3) revealed that tasks requiring children to identify the beginning sounds in words were easier for children to master than tasks targeting final sounds. Adams (1990) concurred with this finding and also identified that middle sounds in words typically require considerably more processing skill than beginning and ending sounds. This is due to the fact that they are considered ‘embedded’ phonemes. For example, in a CVC (consonant-vowel-consonant) word such as ‘bat’, medial phonemes have two adjacent phonemes which impact on their sound. Cassidy et al’s (2008) study concluded also that the position of phonemes in words is a key factor when providing instruction in and assessing children’s phonemic awareness skills. When asking children to identify individual phonemes in words, it is easier for children to identify the initial sound in words than to identify the final sound. Identification of the medial sound in words is considered to be the most challenging.

2.2.6.6 Task difficulty. A final consideration that requires attention is the issue of task difficulty. This applies particularly to phonemic awareness tasks, which can vary in difficulty depending on the number of phonemes in a particular word. For example, two-phoneme spoken words such as ‘see’ or ‘egg’ are considered easier for a child to blend and segment than four-phoneme spoken words such as ‘lamp’ or ‘flame’.

Table 2.4 provides a summary of the development of phonological awareness skills with consideration given to linguistic complexity, task complexity and phoneme position.

Level of Linguistic Complexity	Level of Task Complexity (including phoneme position)	Example
Word Awareness	Sentence segmentation	How many words in this sentence ‘That is a dog’?
Syllable Awareness	Syllable blending	What word is this? ‘pup’ – ‘py’
	Syllable segmentation	Count the syllables in this word: ‘cowboy’

	Syllable deletion	Say 'napkin'. Take away 'kin'. What is left?
	Syllable substitution	Say the word 'suntan'. Change the second syllable to 'flower'. What is the new word?
Onset-rime Awareness	Onset-rime identification	Do these words rhyme: 'blame', 'dame'?
	Onset-rime identification (Oddity task)	Which word does not rhyme: 'dog', 'mat', 'log'?
	Onset-rime blending	Put this onset and rime together. What word do you hear? 'b' – 'at' Response: 'bat'
	Onset-rime segmentation	Say the word 'log'. What is the rime in this word?
	Onset-rime substitution	Tell me a word that rhymes with cat?
Phonemic Awareness	Phoneme identification (Initial phoneme)	What sound do you hear at the beginning of 'bug'? (/b/)
	Phoneme identification (Final phoneme)	What is the final sound in the word 'hat'? (/t/)
	Phoneme identification (Medial phoneme)	What sound do you hear in the middle of the word 'dog'? (/o/)
	Phoneme blending	Put these sounds together. What word do you hear? /s/ - /a/ - /t/
	Phoneme segmentation	Tell me the sounds you hear in the word 'dog'. Response: (/d/ - /o/ - /g/)
	Phoneme deletion	Say 'meat' without the /m/ sound.
	Phoneme addition	Say 'eat'. Add /s/ to the beginning of 'eat'. What is the new word?
	Phoneme substitution	Say the word 'pan'. Now change the middle sound to /i/, what is my new word? Response: ('pin')

Table 2.4 General developmental hierarchy of phonological awareness skills in relation to linguistic complexity, task complexity, and phoneme position (O'Sullivan, 2018).

2.3 Phonemic Awareness and its Specific Importance to the Reading Process

'Faced with an alphabetic script, the child's level of phonemic awareness on entering school may be the single most powerful determinant of the success she or he will experience in learning to read and of the likelihood that she or he will fail.'

(Adams, 1990, p.304)

In 2000, the National Reading Panel was established by US Congress to research how best children learn to read. After conducting a meta-analysis of controlled experimental reading studies published in peer-reviewed journals, they produced their report, *Teaching Children to Read* (2000). This was, and still remains, the largest and most influential research carried out on the teaching of reading to date. The report identified phonemic awareness – along with fluency, vocabulary, phonics and reading comprehension – as one of the five essential components of beginning reading instruction. Closer to home, the joint report published in 2010 by the Education and Training Inspectorate (ETI) in Northern Ireland and the Republic of Ireland Department of Education and Skills Inspectorate on *How Best to Promote and Improve Literacy and Numeracy in our Schools* (DES, 2010), recommended that ‘teaching and learning in literacy are effective when teachers are given the opportunity to become skilled in identifying early reading difficulties and developing expertise to help promote children’s phonemic awareness’ (p. 5).

Phonemic awareness acts as an important bridge between spoken language and written language (Stahl & Murray, 1994; Torgesen et al., 1994; Bus & Van Ijzendoorn, 1999; Catts, Fey, Tomblin, & Zhang, 2002) and an awareness of the individual phonemes in words is critical for grasping the alphabetic principle of the English language and learning how to use it (Shankweiler & Fowler, 2004). The premise here is that if children cannot hear the individual sounds in spoken words, they will struggle to map these sounds onto the letters of the alphabet when they are introduced. Without the development of phonemic awareness, the alphabetic code can be entirely arbitrary, particularly for struggling readers, with the task of dealing with the symbol system often becoming overwhelming (Yopp & Yopp, 2000). Snow et al. (1998) state that ‘because phonemes are the units of sound that are represented by the letters of the alphabet, an awareness of phonemes is key to understanding the logic of the alphabetic principle’ (p.52).

Knowledge of the alphabetic principle is directly linked to word recognition, and, in particular, to decoding. Decoding is an aspect of word recognition that gets particular attention when a child is in the beginning stages of learning to read. It relates to a reader's ability to make meaning from print by recognising printed symbols, attributing a speech sound to them and blending them together in a fluent manner. It is often referred to as 'sounding out' the printed word. Scarborough and Brady (2002) define decoding as 'the process of applying one's knowledge of the correspondences between graphemes and phonemes to determine the pronunciation, and hence the identity, of the word represented by a particular letter sequence' (p. 324). Phonemic awareness has been acknowledged as playing a pivotal role in a child's ability to decode in the early stages of reading (Ball & Blachman, 1991; Bryant et al., 1990; Byrne & Fielding-Barnsley, 1991, 1993, 1995, 2000; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Storch & Whitehurst, 2002; Torgesen et al., 1994; Troia, 1999), as it aids the reader in attributing speech sounds to otherwise arbitrary, meaningless symbols. In the early stages of learning to read, the majority of the printed words encountered by a child are new, and accessing a word by way of phonological representation is particularly important.

Consequently, the ability to identify, blend, and segment the sounds of spoken language at the phoneme level assists children when letters are introduced and helps them to see the connection and relationship between phonemes and graphemes, otherwise known as the alphabetic principle. The long-term effects of children entering school with low levels of phonemic awareness have been documented and research has found that poor readers who enter first grade with poor phonemic awareness are very likely to remain poor readers at the end of fourth grade as their lack of phonemic awareness skills contributes to the slow acquisition of decoding skills (Juel, 1988).

Phonemic awareness, therefore, contributes to early reading development in several important ways:

- It provides children with a platform to understand that the sounds in spoken words can be represented in print (Al Otaiba, Kosanovich & Torgesen, 2012; Torgesen, 1998).
- It enhances children's ability to recognise regular phoneme-grapheme relationships, which consolidates the development of phonological representations that support decoding (Al Otaiba et al, 2012; Ball, 1993; Goswami & Bryant, 1990).
- It helps children to decode words that are partially irregular, by sounding out the regular phoneme-grapheme components with the word and deducing possible word meanings from this (Al Otaiba et al, 2012; Ehri, 1992). For example, if a child comes to an unfamiliar word and can recognize only the initial sound that is associated with the first letter(s), an understanding of phonemic awareness allows the child to search his/her vocabulary for word possibilities beginning with that particular sound.

The role that phonemic awareness plays in learning to read provides a strong rationale for researchers, teachers and policy makers to ensure instruction in phonemic awareness is included as part of early reading classroom practice.

The explicit and systematic, teacher-led phonological awareness programme created and implemented in this dissertation focuses primarily on developing children's phonemic awareness skills. While attention is also given to instruction of the larger phonological awareness skills (eg. syllabification and onset-rime), the programme moves through these skills quickly in order to arrive and provide the majority of instruction at the crucial phoneme level. The programme includes instruction in phoneme identification, blending and segmentation skills; however, the manipulation of phonemes is not included

in the programme as, developmentally, it is considered too difficult a skill for junior infants to perform (Moats, 2003).

2.4 Reciprocal Relationship between Phonemic Awareness and Print Knowledge

The relationship between phonemic awareness and learning to read is a complex one and still a matter of much debate. Three differing hypotheses have been proposed. The first hypothesis considers phonemic awareness to be a prerequisite to success in learning to read. Many instructional interventions have focused on developing phonemic awareness skills prior to reading and results have shown significant improvements in later reading ability (Ball & Blachman, 1991; Bryant et al., 1990; Byrne & Fielding-Barnsley, 1991, 1993, 1995, 2000; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Juel, Griffith, & Gough, 1986; Lonigan, 2003; Storch & Whitehurst, 2002; Torgesen et al., 1994). An opposing hypothesis argues that phonemic awareness typically arises only in the context of instruction in an alphabetic writing system, and, as a result, should be considered an outcome, rather than a prerequisite, of learning to read (Bowey & Francis, 1991; Read, Yun-Fei, Hong-Yin, & Bao-Qing, 1986). Morais (1991), in particular, has argued that phonemic awareness typically arises only in the context of instruction in an alphabetic writing system.

A third hypothesis suggests that a reciprocal and bidirectional relationship exists between phonemic awareness and reading (Burgess & Lonigan, 1998; Ehri & Wilce, 1980; Hogan, Catts & Little, 2005; Perfetti, Beck, Ball, & Hughes, 1987). For instance, an awareness of phonemes contributes to learning the system by which spoken words are spelled in print, and, reciprocally, exposure to print deepens a child's phonemic awareness. Walsh (2009) argues that if we separate conceptual understandings of phonemic awareness from phonemic awareness skills, the relationship between phonemic awareness and reading can be examined further. She contends that a child needs to have an awareness and understanding that words are made up of sounds (phonemic awareness) before letters

are taught; however, once letters are introduced, phonemic skills such as blending, segmentation and manipulation can be further developed and enhanced in the context of print. This echoes Stahl and Murray's (1994) premise that certain levels of phonological awareness precede learning to read, whereas more advanced levels may result from learning to read. This reciprocal relationship between phonemic awareness and print knowledge is evident in Rodhe's (2015) Comprehensive Emergent Literacy Model in her overlapping of the intersections between phonological awareness and print knowledge (see previous section 2.1.1).

The researcher of this dissertation concurs with Walsh (2009) and Stahl and Murray (1994), and argues that children should be introduced to skills of phoneme identification, blending and segmentation before letters are mapped onto these sounds. The researcher strongly believes that children should be exposed to the blending and segmentation of the sounds of their language before being expected to perform these same tasks with letters. A child's demonstration of their ability to perform these crucial tasks at the phoneme level provides us with an indication that s/he is ready for the introduction of letters. Phoneme blending and segmentation skills can be further developed and reinforced after letters have been introduced, and more complex phonemic awareness skills, such as the manipulation of phonemes in spoken words, can then be focused on.

2.5 Explicit Instruction in Phonemic Awareness Skills

Although acknowledged as a crucial skill for future reading success, phonemic awareness is difficult for children to acquire and master without help (Adams, 1990; Snow et al., 1998). Research evidence has demonstrated that the majority of young children require explicit instruction in acquiring phonemic awareness as it is not typically achieved through exposure alone (Adams, 1990; McBride-Chang, Bialystok, Chong, & Li, 2004; Nevills & Wolfe, 2009). This is due to the fact that the individual phonemes in spoken language are typically not pronounced separately in a speech stream, but are instead

blended together into larger sound units (Chall, 1983; Gillon, 2004; Ranweiler, 2004; Stahl & Murray, 1994). This makes the segmentation, or pulling apart, of a spoken word into individual phonemes extremely difficult.

Liberman, Cooper, Shankweiler, and Studdert-Kennedy (1967) highlighted that the advantageous result of such coarticulation is that speech can proceed at a pace at which it can be understood. Imagine trying to understand speech if it were segmented sound by sound. However, a much less advantageous result of coarticulation, particularly for the beginning reader, is that there is no neat correspondence between the underlying phonological structure and the sound that comes to the ears. For example, though the word 'bag' has three phonemes, and, correspondingly, three letters in print, it only has one pulse of sound when spoken. The three phonemes overlap and merge into one sound: 'bag'. Beginning readers can only understand, and properly take advantage of, the fact that the printed word *bag* has three letters if they are made aware that the spoken word 'bag' can be segmented into three phonemes. As a result, children need to be explicitly taught to perceive breaks that they do not actually hear within spoken language (Ranweiler, 2004).

Carson et al.'s (2013) study investigated the influence of a short and intensive period of phonological awareness instruction implemented by classroom teachers on raising literacy achievement for children. A quasi-experimental design was used to measure the phonological awareness, reading, and spelling development of 129 children aged five years. Thirty-four children received 10 weeks of phonological awareness instruction from their teachers, while ninety-five children continued with their usual reading program, which included phonics instruction but did not target phonological awareness specifically. The results demonstrated that children who received phonological awareness instruction demonstrated superior literacy outcomes compared to children who followed the usual curriculum. Furthermore, the number of children experiencing word-decoding difficulties declined from 26% among children who followed the usual literacy

curriculum to 6% among children who received phonological awareness instruction. Consequently, this study demonstrates that a short and intensive period of classroom phonological awareness instruction can raise the literacy profiles of young readers.

As emergent literacy provides the conceptual framework for this dissertation, it is important to draw attention that within emergent literacy there is much disagreement as to what type of experiences and instruction are regarded as appropriate for emergent readers. Proponents of emergent literacy often recommend an unsystematic and informal exploration of literacy concepts and believe that it is not developmentally appropriate to include direct, systematic instruction before children reach kindergarten (5-7 years of age) or even first grade (Neumann & Dickinson, 2002). *Aistear* (NCCA, 2009) echoes this recommendation as it states that adults working with young children should ‘draw children’s attention to letters and their sounds as part of their daily activities, play and routines’ (p. 40).

In light of this, the researcher faced a challenge when introducing emergent readers to instruction in phonemic awareness. While many would argue that developing children’s phonemic awareness skills requires direct and explicit instruction (Adams, 1990; Ehri et al., 2001; McBride-Chang et al., 2004; Nevills & Wolfe, 2009), others, such as McGee and Purcell-Gates (1997), contend that the explicit and direct nature of instruction in code-focused skills, such as phonemic awareness, do not belong within the realm of emergent literacy. This poses a particular challenge in an Irish context as children begin formal schooling from the age of four; therefore, most, if not all, of these children are still regarded as emergent readers when they begin school.

In the context of this dissertation, the researcher would argue that emergent literacy should be considered as consisting of two substages. The first stage focuses on the type of emergent literacy learning that occurs within the home or preschool (prior to formal schooling). The second stage focuses on children who are still in the emergent literacy

stage but have made the transition to school. The children who are in the first stage learn about literacy in social situations from their primary caregivers and their families through informal and explorative learning experiences. The researcher would contend, however, that as children transition into school, instruction in emergent literacy skills needs to also include a more explicit and systematic approach to literacy instruction. This suggestion that emergent literacy be represented as two substages, emphasises the role sociocultural context and environmental setting has on children's literacy learning. The researcher would argue that the differences between the contexts of home and/or preschool and formal school have a significant effect on the manner in which instruction in emergent literacy skills is approached.

While meaning-focused skills such as oral language and vocabulary development can still be taught in a similar manner as Stage One in school, ie. through play, shared story book and dialogic reading, in Stage Two, more focus needs to be placed on instruction in code-focused skills, such as phonemic awareness, as these skills are also crucial to supporting children's future reading. In 2015, the National Educational Psychological Service (NEPS) published their good practice guide *A Balanced Approach to Literacy Development in the Early Years*. This guide states that 'even the most able pupils will need explicit instruction particularly in the higher levels of phonemic awareness' (p. 35). Michael Pressley also argues that children's early literacy experiences need to involve a balance of skills-based and whole-language teaching (Pressley, 2006). Furthermore, just because learning needs to become more explicit, direct and systematic in nature, does not mean that we need to return to the 'reading readiness' approach of drill-like instruction. Indeed, for emergent readers, explicit and systematic instruction should be provided as hands-on, active learning experiences. Examples of these learning experiences, which are incorporated into the phonological awareness programme created for this dissertation, are discussed in more detail in Chapter Five.

The next section of this chapter examines key features and characteristics of effective phonological awareness programmes. These key characteristics were considered by the researcher when creating the phonological awareness programme implemented in this dissertation.

2.6 Components of Effective Phonological Awareness Programmes

Phonological awareness programmes have been found to differ with regards to their content, sequence of included components, and duration (Bus & Van Ijzendoorn, 1999). The researcher examined a range of published products and resources available to support the teaching of phonological and phonemic awareness, and, found that while there was much research published on phonological awareness, there were few instructional programmes available that focused primarily on phonological awareness, and even fewer that focused on phonemic awareness, particularly in an Irish context.

The researcher identified and analysed five research-led, phonological awareness programmes readily available to teachers. Each of the programmes analysed emphasised different skills, with one focusing entirely on phonemic awareness, while others focused on broader phonological awareness skills and print awareness. Table 2.5 outlines the content, targeted population, delivery methods and length of lessons of the six phonological awareness programmes analysed by the researcher.

	Phonemic Awareness in Young Children	Ladders to Literacy	Phonological Awareness Training for Reading	Road to the Code	Stepping Stones	Phonological Training Programme
No. of activities	71	70+	53	44	50	22
Components in addition to phonological awareness activities	None	Print awareness; oral language	None	Letter knowledge	Letter knowledge; listening activities; serial processing	Grapheme-phoneme conversion; decoding and encoding
Targeted population	Kindergarten, first grade, special education	Kindergarten	At-risk kindergarten and first grade	At-risk kindergarten and first grade	At-risk kindergarten and first grade	5-7 year olds with spoken language impairment
Group size	No recommenda	Large to small groups	3-5 children or 1-to-1	Small groups	2-5 children	1-to-1

	tion					
Length of sessions	15-20 mins x 4 days per week	No recommendation	20-25 mins x 3-4 days per week	15-20 mins	20 mins x 5 days per week	1 hour x 2 days per week
Duration	No recommendation	No recommendation	12-14 weeks	11 weeks	10 weeks	10 weeks
Instruction	Guidelines and suggestions	Guidelines and suggestion	Prescribed	Prescribed and scripted	Highly specified	Prescribed
Authors	Adams et al. (1998)	O'Connor et al. (1996)	Torgesen & Bryant (1994)	Blachman et al. (2000)	Nelson et al. (2004)	Gillon (2008)

Table 2.5 Overview of six phonological awareness programme components and instructional suggestions

As can be seen from Table 2.5, the phonological awareness programmes available to teachers vary considerably in their content, duration and instructional approach. Despite this, researchers have identified some consistent characteristics and features that contribute to the effectiveness of literacy programmes (Good, Simmons, & Smith, 1998; Phillips, Clancy-Menchetti, & Lonigan, 2008; Smith, Simmons, & Kame'enui, 1998). These components are described in more detail in the next section.

2.6.1 Instructional components of phonological awareness programmes.

Phillips, Clancy-Menchetti and Lonigan (2008) examined a number of research studies that explored the development of phonological awareness skills in young children and identified several key elements to consider when providing systematic and explicit instruction in this area. These elements include instructional sequencing, modelling and explaining; scaffolding; and providing corrective feedback.

Instructional sequencing requires teachers to plan ahead of time what they are going to teach and the order in which it is to be taught (eg. systematically from word awareness, to syllable awareness, to onset-rime awareness, and, finally, to phonemic awareness skills). Attention also needs to be paid to the pacing of the instruction and how children are grouped during instruction (eg. whole class, small group or one-to-one). The pacing of phonological awareness lessons should be fast paced to ensure the engagement of young children. Furthermore, focusing on a single phonological awareness skill per session is considered to be more effective than introducing a number of skills at the same

time. Multiple opportunities to explore and utilise the newly acquired skills taught during the day/week are also imperative in supporting and developing children's phonological awareness. For example, if explicit instruction has focused on identifying beginning phonemes in words, the teacher might, later that day, ask the children to line up for yard according to the sound at the beginning of their name, ie., 'Can all the children whose names begin with /m/ line up'. Feedback in the form of frequent, positive reinforcement is particularly important to provide when young children are acquiring a new skill, and this feedback should be delivered as immediately as possible.

Overall, a classroom that supports a planned, systematic and explicit approach to phonological awareness would ensure that instruction

- takes place with small groups of children
- is modelled by the teacher
- is fast-paced
- provides visual, active, hands-on learning activities
- is reinforced informally throughout the day
- provides feedback to children.

Three further components that are specific to instruction in phonological awareness skills include

- ensuring teachers' model the clear and consistent articulation of sounds,
- ensuring phonological awareness programmes focus strongly on phonemic awareness skills, particularly the skills of phoneme blending and segmentation,
- consideration of the duration and intensity of such programmes

Teachers must ensure they are providing clear and consistent articulation of sounds during instruction, as children will repeat the teacher's modeling of sounds. Therefore, it is important that teachers understand the difference between stop sounds (eg. b, c, d, g, j, k, p, q, t, x) and continuous sounds (f, l, m, n, r, s, v, w, z). Stop sounds are only said for an

instant, whereas continuous sounds are pronounced for several seconds. These continuous sounds should be said in a monotone voice. Furthermore, teachers must ensure they avoid adding an ‘uh’ at the end of sounds; eg., making a clear and articulate /k/ sound rather than saying /cuh/. Attention to the correct articulation of sounds ensures that the skills of blending and segmentation of phonemes in words will be an easier task for children.

Researchers have also promoted the idea that phonological awareness instruction should be provided at the phoneme level once children enter school (Gillon, 2004; Smith et al., 1998). Focusing on phonemic awareness skills means that instructional time is focused on the phonological awareness skill most strongly associated with early reading success (Carson, Gillon, & Boustead, 2013). Consequently, a shift needs to occur in primary school from instruction in the broad skills of phonological awareness (eg. word, syllable and onset-rime awareness) to instruction that focuses on the crucial phoneme level skills. In fact, research has demonstrated that while programmes/interventions that focus on broader phonological awareness skills have improved outcomes immediately post-instruction, they have struggled to demonstrate sustained improvements (Carson, 2014).

The two most crucial phonemic awareness skills that directly affect future reading, and, therefore, are the most important to develop in young children, are the *segmentation* of words into their phonemic parts and the *blending* of phonemic parts into whole words (Yopp, 1988). Both phoneme blending and segmentation tasks are considered to provide the most robust relationship with early reading skills (Van Bon & Van Leeuwe, 2003; Yopp, 1988). Researchers have reported that both of these skills can be successfully taught to young children (Cunningham, 1990; O’Connor, Jenkins, & Slocum, 1995). One study found that kindergarten children who received instruction in both phoneme blending and segmentation not only reported significant improvement on these types of tasks but were also better able to generalise their phonological knowledge to other phonemic awareness tasks when compared with those in a control group (O’Connor et al., 1995).

Another study demonstrated that kindergarteners who received instruction in both phoneme blending and segmentation performed higher on measured phonemic awareness tasks than both kindergarten and first-grade children who had not received such instruction (Cunningham, 1990). According to Gillon (2005), it is crucial that the content of phonological awareness programmes target phoneme blending and segmentation skills in order for programmes to benefit a child's future reading achievement.

Finally, as can be seen from Table 2.5, the duration and intensity of phonological awareness programmes often differ; however, the National Reading Panel (NICHD, 2000) suggests that a little goes a long way when providing phonological awareness instruction to children. They found that typical intervention programmes have been spread over 7 to 12 weeks, with 3 to 5 sessions per week, lasting 15 to 30 minutes in length. Findings from the NRP report also suggested that longer programmes did not necessarily lead to greater benefits.

Chapter Five of this dissertation describes, in detail, the phonological awareness programme that was created by the researcher and implemented by junior infant classroom teachers. In its development, the researcher took cognisance of the research-based, effective components of phonological awareness programmes highlighted in this section.

2.7 Assessment of Phonological and Phonemic Awareness

Whitehead (2004) recommends that literacy progress must be monitored closely in the early years and should be a dominant focus in early years' classrooms. Consequently, it is imperative that measures of phonological awareness be taken into account when assessing young children's early literacy skills in the infant classes so as to determine their future reading outcomes and/or risk of future reading difficulties.

Interestingly, research indicates that beyond kindergarten, phonological awareness may offer little unique information regarding children's later word reading. Wagner, Torgesen, Rashotte, Hecht, Barker, Burgess, and Garon's (1997) longitudinal study

indicated that from kindergarten to second grade, phonological awareness predicted a 23% unique variance in later word reading, 8% from first to third grade, and from second to fourth grade only 4%. In a later review of this research, Torgesen (1998) concluded that the limited amount of information gained from the assessment of phonological awareness beyond second grade may not warrant the use of a phonological awareness assessment given the amount of time required for the administration, scoring and interpreting of such assessments. These findings were supported by Hogan, Catts, and Little's (2005) research, which indicated that a measure of phonological awareness in kindergarten predicted second grade reading, but this was no longer the case once the children reached second to fourth grades. It would appear from these studies that once children begin reading, the best indicator of future reading is reading itself (Bell, McCallum, & Cox, 2003).

The above studies indicate that there is a small window of opportunity within which phonological awareness can be used as an assessment of future reading ability. For this reason, and considering that phonemic awareness is recognised as a powerful predictor of children's future reading achievement (Adams, 1990; Carson et al., 2013; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002), it is imperative that teachers in infant classes assess and monitor children's phonological awareness regularly to identify those who may present with future reading difficulties. Assessment of phonological awareness can lead to the introduction of phonological awareness intervention programme, which promote more preventative measures of combating reading difficulties rather than remediating for difficulties once formal reading has begun.

A number of assessment tools are currently available to assess children's phonological awareness; however, few of these tools comprehensively assess phonological awareness at the crucial phoneme level. In their review, Sodoro, Allinder and Rankin-Erickson (2002) listed the most commonly used instruments employed in classrooms to

assess phonological awareness. These included the *Comprehensive Test of Phonological Processing* (CTOPP) (Wagner, Torgesen, & Rashotte, 1999), the *Test of Phonological Awareness* (TOPA-2+) (Torgesen & Bryant, 1994), the *Phonological Awareness Profile* (Robertson & Salter, 1995), and the *Yopp-Singer Test of Phoneme Segmentation* (Yopp, 1995). Other measures, as suggested by the NCCA, for assessing phonological awareness in the early years include the *Preschool and Primary Inventory of Phonological Awareness* (PIPA) (Dodd, Crosbie, McIntosh, Teitzel, & Ozanne, 2000) and the *Phonological Awareness Test 2* (Robertson & Salter, 2007).

Table 2.6 profiles these assessments and compares them on the basis of administration time, the modality of the administration (whether it is a paper-based or a computer-based assessment) and the content of the assessment. In relation to content, an instrument that has a high-priority focus on phonological awareness at the phoneme level is considered narrow, while assessments that focus on a broader range of phonological abilities (for example, syllabification or onset-rime) or other aspects of language (for example, vocabulary or word decoding) are considered broad.

Instrument	Administration Time (minutes)		Modality		Content	
	Teacher	Child	Paper	Computer	Broad	Narrow
CTOPP**	30	30	+		+	
TOPA-2+**	30-45	30-45	+			+
PA Profile	10-20	10-20	+		+	
Yopp-Singer	5-10	5-10	+			+
PIPA	25-30	25-30	+		+	
PAT2	40	40	+		+	

Table 2.6 Administration time, modality and content of commonly-used phonological assessment

instruments available to classroom teachers

Note. ** indicates that the assessment can be administered on an individual basis or to a small group of children.

Table 2.6 highlights the time-consuming nature of many of the assessment tools available for classroom use, with the administration of such tools ranging from 5 minutes to 45 minutes. With the exception of the CTOPP and TOPA-2+, each of the assessments are conducted on a one-to-one basis with children. This means that a teacher administering such an assessment needs to find a quiet space where s/he can sit with one child at a time for, on average, 20 minutes per child. Therefore, if we consider that many teachers in Ireland teach class sizes of between 28 and 30 junior infant children, it could take up to and above 9 hours (based on an average of 20 minutes administration time per pupil) to assess the phonological awareness of an entire class. This time equates to two junior infant school days. It should be noted that this time consists of test administration only and does not include the time required for recording and scoring the results. If we further consider that it is imperative that a child's phonological awareness be monitored and assessed a number of times during the school year, this could mean that, in total, up to one week of the school year would need to be set aside for assessing children's phonological awareness skills. Furthermore, assessing a child's phonological awareness is only one early literacy skill that teachers need to assess. The worrying outcome of the time-consuming nature of such phonological awareness assessments is that teachers may decide not to administer these assessments at all as they simply cannot find the time to do so. McLeod, Fisher, and Hoover (2003) argue that teaching methods and strategies may go unused by teachers if they are considered too time consuming to implement.

This issue regarding the time required to administer phonological awareness assessments is particularly pertinent in an Irish context. The *Primary Curriculum Review: Phase 2* (NCCA, 2008), noted that teachers considered time to be a major challenge in relation to carrying out and conducting assessment in their classrooms. In an earlier review (NCCA, 2005), the NCCA had previously indicated that teachers needed to increase their knowledge of, and competencies in, their assessment of pupil progress. This

was echoed by the Department of Education Inspectorate in their report *An Evaluation of Curriculum Implementation in Primary Schools – English, Mathematics, and Visual Arts* (DES, 2005). The shortcomings identified in this report included the use of a restrictive range of assessment strategies, insufficient monitoring of children's progress and ineffective use of the outcomes of assessment to inform planning, teaching or learning.

After concluding an analysis of existing phonological awareness assessment tools, two shortcomings were identified by the researcher. These included

1. the time-consuming nature of already available phonological awareness assessment tools due to the need to conduct these assessment on a one-to-one basis with children
2. the content of many of existing assessment tools focus on assessing broader phonological skills (such as word awareness, rhyme, and syllable awareness) rather than assessing crucial phoneme-level skills.

The researcher of this dissertation examined the research literature in an attempt to find a solution to address these shortcomings and came across a study by Carson, Boustead and Gillon (2013). In their study, the content validity of a computer-based phonological awareness screening and monitoring assessment (Com-PASMA) designed to evaluate school-entry phonological awareness abilities was investigated. Ninety-five children participated in a 1-year longitudinal study whereby the Com-PASMA was administered at the start, middle and end of the school year. The results indicated that (1) initial phoneme identity tasks were most appropriate at school-entry and sampled a spectrum of difficulty levels, and (2) more challenging phoneme level tasks (for example, final phoneme identity, phoneme blending, phoneme segmentation) became increasingly appropriate and differentiated between high- and low-ability students by the middle and end of the first year of school. Inspiration was drawn from Carson et al.'s study and, consequently, the researcher of this dissertation designed an iPad-based phonemic awareness assessment app

in order to alleviate some of the shortcomings of more traditional phonological awareness assessment tools. The creation, development and piloting of the app will be described in more detail in Chapter Four.

The remainder of this chapter will examine educational disadvantage and its impact on children's achievements in literacy. The next section examines the current status of educational disadvantage in Ireland and highlights initiatives and policies that have been implemented in an effort to combat educational disadvantage. The reading levels of children attending DEIS schools as reported in national assessments of English reading are explored, and literacy initiatives that have been introduced into designated disadvantaged schools are discussed. Finally, a number of international research studies that have examined the implementation of phonological awareness programmes/interventions with children from socioeconomically disadvantaged areas are described.

2.8 Educational Disadvantage

Equality of opportunity in literacy is a prominent concern of educational policy both in Ireland and internationally. The link between lower levels of language skills and social disadvantage has resulted in the implementation of programmes such as *Sure Start* in the UK (Glass, 1999) and *Head Start* in the USA (Aughinbaugh, 2001). In Ireland, the *Early Start* (DES, 1994) and *DEIS* (DES, 2005, 2017) programmes have been introduced to address educational disadvantage and, in particular, to improve literacy and numeracy levels in schools serving areas of socioeconomic disadvantage.

Internationally, reading assessments, such as the *Programme for International Student Assessment* (PISA) and the *Progress in International Reading Literacy Study* (PIRLS), are conducted throughout OECD countries every four years to monitor literacy levels, with the results of these assessments being published and heavily scrutinised. Recent PIRLS (2016) results have shown Irish ten-year-olds to be in the top four OECD countries with regards to reading ability. From these results, we could assume that the

literacy interventions implemented in Ireland are working; however, the results of the National Assessment in English Reading and Mathematics (Shiel et al., 2014) highlighted that, although there were significant increases in reading performance in all Irish schools between NAER 2009 and NAER 2014, the most disadvantaged schools, DEIS urban Band 1 primary schools, were found to have, on average, lower reading scores, along with a higher concentration of children with very low test scores. Therefore, while there have been improvements in reading scores nationally, the gap in reading levels between those attending the most disadvantaged schools in Ireland (DEIS urban Band 1 schools) and their peers from non-DEIS schools remains as prevalent as ever.

Children from lower socioeconomic backgrounds have consistently lagged behind their more affluent peers in many key aspects of emergent literacy. Research conducted by Lonigan and colleagues (Lonigan et al., 1998) and others (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997) has consistently shown that preschool and early school-age children from lower socioeconomic backgrounds demonstrate lower phonological awareness skills than their more affluent peers. These findings suggest that instruction in phonological awareness skills is especially critical for children from such backgrounds. Furthermore, Foorman and Torgesen (2001) recommend that readers, who may present with future reading difficulties, need to receive more explicit, more intensive, and more scaffolded instruction than those who do not. This recommendation is discussed in more detail in section 2.11. The next section examines policies that have been implemented in Ireland in an attempt to combat educational disadvantage. This will be followed by a section exploring the effects of educational disadvantage on primary children's literacy levels.

2.9 Educational Disadvantage in Ireland

According to Smyth and McCoy (2009), education in Ireland is highly predictive of individual life chances and a Leaving Certificate qualification has become the ‘minimum’ educational requirement to secure access to further education/training and high-quality employment. Performing academically in school can result in children doing well economically later in life; however, many children’s chances of academic success are hampered as a result of educational disadvantage.

Equality of opportunity in the field of education has been a prominent discourse in educational policy in Ireland. *The Programme for a Partnership Government* (2016) reported that “education is the key to giving every child an equal chance in life and our ambition is that every child has an opportunity to participate in creating and sharing new wealth for our country” (p. 86). However, responding to the complex, multifaceted nature of educational disadvantage is challenging and there are no ‘quick fixes’ (DEIS, 2005). Despite international and national awareness of educational disadvantage and the various policy documents targeting educational disadvantage, it still remains one of the most challenging problems facing education systems today.

In the 1990s, there was an increasing policy focus on educational inequality in Ireland and the term ‘educational disadvantage’ became more common in educational discourse (Smyth & Hannan, 2000). The *Education Act* (1998) defined educational disadvantage as ‘the impediments to education arising from social or economic disadvantage which prevent students from deriving appropriate benefits from education in schools’ (32[9]). The Education Act also led to the formation of the Educational Disadvantage Committee.

There are many and varied causal factors related to educational disadvantage documented in the research literature including the welfare needs of children not being met, a lack of family tradition in education, a lack of books in the home, the high

participation costs of education, and the failure of the educational system to reflect cultural backgrounds and learning styles of all learners. These environmental factors are emphasised in Rohde's CELM (2015) and are considered barriers to the early development of children's emergent literacy (see section 2.1.1). From the wide range of research examining the causes and effects of educational disadvantage in Ireland, Kellaghan, Weir, O hUallachain and Morgan (1995) identified a number of key indicators. These included

- Poverty linked to economic limitations.
- Family structure and size-single parent families are usually more associated with educational disadvantage.
- Socioeconomic status: the relationship between a child's family background and educational achievement and attainment. For example, a mother's educational level can be a very important indicator in this regard.
- Location: Kellaghan et al. (1995) believe this to be particularly relevant for rural disadvantage.

A range of initiatives and policies have been implemented in Ireland in an effort to combat educational disadvantage. A dominant feature of educational policy on disadvantage has centred on the provision of additional funding for schools serving disadvantaged populations. In 1984, the Department of Education introduced a number of measures to address the issue of disadvantage in selected primary schools in Dublin, Cork and Limerick. These measures later became known as the *Disadvantaged Areas Scheme*. Under this scheme, schools received increased capitation and grants to implement home-school activities. In 1990, more specific indicators were introduced in the identification of disadvantaged schools in Ireland. The indicators included

- Families resident in local authority housing or non-permanent accommodation
- Families holding medical cards

- Families in receipt of unemployment benefit

In 2001, the *Designated Areas Scheme* was subsumed into the *Giving Children an Even Break* (GCEB) initiative. Under this initiative, additional funding and support was allocated for disadvantaged schools and class sizes were reduced. The pupil-teacher ratio was reduced to 20:1 in junior classes (infants to 2nd class) and 27:1 in senior classes. However, unlike previous schemes, accountability was now demanded of schools under the GCEB initiative, with schools required to produce 3-year development plans. In 2003, the Educational Disadvantage Committee was tasked with identifying the strengths and weaknesses of previous educational disadvantage initiatives, and, in 2005, the *DEIS Action Plan: Delivering Equality of Opportunity in Schools* was introduced as the main policy initiative to tackle educational disadvantage. The aim of this plan was to focus on ‘addressing the educational needs of children and young people from disadvantaged communities, from pre-school through second-level education (3 to 18 years)’ (DES, 2005, p.7).

An important aspect of the DEIS plan was the allocation of DEIS status to schools serving areas of disadvantage throughout the country. In allocating DEIS status to primary schools, variables such as the following were reported by school principals.

- % unemployment
- % local authority accommodation
- % lone parenthood
- % Travellers
- % large families (5 or more children)
- % children eligible for free books

The information collected was then analysed to provide a rank order of all schools, according to a school's relative level of disadvantage against all other schools. The manner in which DEIS status was allocated to schools has been one of its more criticised aspects,

with some schools noting a perceived lack of objectivity in the identification process (DES, 2015). A further criticism, noted in the *Looking at Action Planning for Improvement in DEIS Primary Schools* (DES, 2015) report, was that the allocation provided only a snapshot of the social context of a school at a given time.

The *DEIS Action Plan* (2005) also brought together and made improvements to a number of existing initiatives, including the *Early Start Programme*, the *Home-School-Community-Liaison Scheme*, the *School Completion Programme* and the *Giving Children an Even Break* programme, under the *School Support Programme* (SSP). Schools eligible under DEIS were required to accept specific conditions, such as placing an extra emphasis on literacy and numeracy, increasing parental involvement in the life of the school, providing extra professional development opportunities for teachers, and adopting measures to improve school attendance. Urban schools serving areas with the greatest level of disadvantage were classified as Band 1 schools and currently receive the highest level of supports and resources, while the remaining urban participating schools were classified as Band 2 schools. Outside of urban areas, rural DEIS schools have also been identified. These schools also receive significant levels of support and resources. According to Department of Education and Skills figures, 699 primary schools in Ireland were allocated DEIS status in 2018 (232 urban Band 1 schools, 107 urban Band 2 schools and 360 rural schools). The duration of the *DEIS Action Plan* (2005) was ten years and it came to an end in 2015.

Since then, a number of reviews and evaluations of the *DEIS Action Plan* (2005) have taken place. In April 2015, the DES commissioned an ESRI report entitled *Learning from the Evaluation of DEIS* (Smyth, McCoy, & Kingston, 2015). This report provided key recommendations including the future delivery of interventions to support children at risk of not reaching their full potential in light of their socioeconomic background. The report found

- an overall improvement in planning for teaching and learning, and in setting targets for achievement in DEIS schools.
- an increase in reading test scores over time; however, in the context of the *2014 National Assessments of English Reading and Mathematics* (Shiel et al., 2014), the gap in achievement between DEIS urban Band 1 schools and non-DEIS schools has not narrowed.
- that the most disadvantaged schools, urban Band 1 primary schools, are found to have much lower reading scores on average as well as a higher concentration of students with very low test scores.
- the need for continued supports and funding for DEIS urban Band 1 schools due to the concentration of disadvantage evident in these schools.

In 2017, the new *DEIS Plan* was launched based on the findings and recommendations from a number of reviews and evaluations of its predecessor. These reviews included the ESRI *Learning from the Evaluation of DEIS Report* (Smyth et al., 2015) and the *Report on the Review of DEIS* (DES, 2016). It was also influenced by a range of broader policy documents, including *The National Policy Framework for Children and Young People 2014-2020 – Better Outcomes, Brighter Futures*, the *Programme for a Partnership Government* (Department of Children and Youth Affairs, 2016), and the *Action Plan for Education* (DES, 2017). The *DEIS Plan* (2017) set five key goals, which were:

- To implement a more robust and responsive assessment framework for identification of schools and effective resource allocation.
- To improve learning experience and outcomes of children in DEIS schools.
- To improve the capacity of school leaders and teachers to engage, plan and deploy resources to their best advantage
- To support and foster best practice in schools through inter-agency collaboration.

- To support the work of schools by providing the research information, evaluation and feedback to achieve the goals of the plan.

One of the key literacy-related targets of the *DEIS Plan (2017)* includes the introduction of DEIS-specific literacy targets, which were recommended in the *Interim Review of the Literacy and Numeracy Strategy for Learning and Life (DES, 2017)*. These DEIS-specific literacy targets are outlined in section 2.10.

2.10 Educational Disadvantage and Literacy Levels in Ireland

Within the Irish education system, low levels of achievement in literacy for children from lower socioeconomic backgrounds is an ongoing concern. These children have, on average, significantly lower mean achievement scores in literacy than children attending non-DEIS schools (Cosgrove et al., 2000). In 2004, the Department of Education Inspectorate evaluated a number of DEIS schools and reported that fewer than half the children in middle and senior classes were able to read fluently and with understanding (DES, 2005).

The strong relationship between poor reading skills and educational disadvantage prompted the implementation of literacy interventions such as the *First Steps in Literacy* programme (Department of Education and Training in Western Australia, 2004), a whole-school approach to improving and monitoring overall literacy levels, which includes instruction in a broad range of reading, writing and oral language skills. *Reading Recovery* (Clay, 1993) was also introduced and mandated in designated-disadvantaged schools. *Reading Recovery* is implemented in the second year of school, after children have already begun formal reading. Children who are targeted for this programme score in the lowest 20% in diagnostic reading tests. Therefore, the focus of this programme is on remediating children who have already been identified as struggling readers. Neither of these literacy interventions offer targeted and focused instruction in emergent literacy skills, such as phonological awareness and phonemic awareness, during the first year of formal

schooling. To date, the researcher is not aware of any mandated literacy initiatives in place in DEIS schools that focus on instruction in crucial emergent literacy skills.

The researcher of this dissertation would argue that current mandated literacy interventions are being implemented too late in a child's reading development, as gaps in reading ability are already apparent before these interventions are put in place. Research has found that children who experience early difficulties in learning to read are unlikely to catch up with their peers (without intensive intervention) and, perhaps more importantly, these children also begin to acquire a negative attitude to reading (Torgesen, Wagner, & Rashotte, 1997). Therefore, children who display reading difficulties from a young age need to be identified quickly in order to remediate such difficulties as early as possible. As argued previously, one of the most powerful aspects of phonemic awareness is its power as a predictor of future reading abilities (Adams, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002). Therefore, the introduction of an explicit and systematic phonological awareness programme, focused at the crucial level of the phoneme, could provide the necessary instruction and support to prevent future reading difficulties, even before formal reading has begun. This provides a strong rationale for the inclusion of such a programme in infant classrooms, particularly in DEIS urban Band 1 schools.

While the NAERM 14 (Shiel et al., 2014) results showed evidence that children's overall reading performance improved compared to NAERM '09 (Eivers et al., 2010), children attending DEIS urban Band 1 schools scored significantly lower on overall reading scores than children in all other school types. These results can be seen in Tables 2.7 and 2.8, which highlight children's mean scores in all primary school types on the overall English reading scale for both 2nd class and 6th class.

	Overall			Comprehension			Vocabulary		
	NA '09	NA '14	<i>d</i>	NA '09	NA '14	<i>d</i>	NA '09	NA '14	<i>d</i>
Urban Band 1 (Ref)	218	232	0.35	221	233	0.30	217	233	0.36
Urban Band 2	228	255*	0.60	231	255*	0.51	228	254*	0.58
Urban, non-DEIS	253*	268*	0.32	252*	266*	0.28	253*	269*	0.31
Rural DEIS	262*	267*	0.11	259*	264*	0.10	265*	269*	0.08
Rural, non-DEIS	258*	268*	0.22	257*	266*	0.22	257*	269*	0.25

NA '14 scores in bold are significantly different from the corresponding NA '09 mean scores.
NA '14 scores marked with an asterisk are significantly different from the mean of the reference group.

Table 2.7 Mean scale scores on the overall English reading scores by school status – 2nd class

	Overall			Comprehension			Vocabulary		
	NA '09	NA '14	<i>d</i>	NA '09	NA '14	<i>d</i>	NA '09	NA '14	<i>d</i>
Urban Band 1 (Ref)	220	233	0.29	221	233	0.27	221	235	0.30
Urban Band 2	232	246*	0.29	232	245*	0.26	231	248*	0.34
Urban, non-DEIS	254*	267*	0.27	253*	264*	0.23	254*	270*	0.32
Rural DEIS	255	272*	0.34	256	270*	0.27	255	275*	0.41
Rural, non-DEIS	252*	268*	0.32	253*	265*	0.24	251*	270*	0.39

NA '14 scores in bold are significantly different from the corresponding NA '09 mean scores.
NA '14 scores marked with an asterisk are significantly different from the mean of the reference group.

Table 2.8 Mean score scales on the overall English reading scores by school status - 6th class

Worryingly, Tables 2.9 and 2.10 highlight that 44% of 2nd class children and 47% of 6th class children attending DEIS urban Band 1 schools recorded reading scores at or below Level One. At this level, children would be expected to be able to complete only the most basic tasks, while children below Level One are consistently not able to successfully display the skills assessed by the simplest items on the test.

	Urban Band 1		Urban Band 2		Urban, non-DEIS		Rural DEIS		Rural, non-DEIS	
	09	14	09	14	09	14	09	14	09	14
	%	%	%	%	%	%	%	%	%	%
Below Level 1	21.5	15.5	16.4	5.1	8.8	4.9	3.9	6.1	7.1	2.8
Level 1	42.0	28.4	33.4	23.2	22.8	14.3	27.5	10.8	22.5	16.5
Level 2	24.7	38.4	31.7	37.1	31.6	32.1	23.2	36.8	29.9	30.9
Level 3	10.4	16.1	16.5	25.2	26.8	33.5	33.8	32.4	28.0	35.0
Level 4	1.5	1.7	2.0	9.5	10.1	15.2	11.6	14.0	12.5	14.7

Table 2.9 Percentages of children at each proficiency level on the overall English reading scale, by school status and year – 2nd class

	Urban Band 1		Urban Band 2		Urban, non-DEIS		Rural DEIS		Rural, non-DEIS	
	09	14	09	14	09	14	09	14	09	14
	%	%	%	%	%	%	%	%	%	%
Below Level 1	21.5	12.5	16.4	9.2	8.8	4.2	3.9	2.2	7.1	3.6
Level 1	42.0	34.8	33.4	29.0	22.8	17.5	27.5	14.2	22.5	17.8
Level 2	24.7	31.4	31.7	30.3	31.6	31.3	23.2	28.3	29.9	31.8
Level 3	10.4	17.9	16.5	22.6	26.8	31.4	33.8	43.6	28.0	29.8
Level 4	1.5	3.4	2.0	9.0	10.1	15.6	11.6	11.7	12.5	17.0

Table 2.10 Percentages of children at each proficiency level on the overall English reading scores, by school status and year – 6th class

Therefore, it would appear that despite the introduction of mandated literacy interventions, the literacy gap between children attending DEIS urban Band 1 schools and their peers in non-DEIS urban schools has not decreased. This prevailing gap has prompted the introduction of specific literacy targets for children attending DEIS urban Band 1 schools, as set out in the *Interim Review of the Literacy and Numeracy Strategy* (DES, 2017). These targets are expected to be achieved by 2020. Table 2.11 details these new targets and compares them to targets set for non-DEIS schools.

	Class	Current position NAERM (2014)	New DEIS Urban Band 1 school targets for 2020	Non-DEIS school targets for 2020
Reading: at or below Level 1	Second class	44%	40%	20%
	Sixth class	47%	40%	20%
Reading: at or above Level 3	Second class	18%	25%	50%
	Sixth class	21%	27%	50%

Table 2.11 Comparison of reading targets set for 2020 for DEIS and non-DEIS schools

The researcher would contend that the introduction of an early *prevention* programme, that focuses on instruction at the crucial phoneme level, could potentially improve later reading scores of children attending DEIS urban Band 1 schools, due to the

causal relationship that is evident between phonemic awareness and later reading achievement (Adams, 1990; Ball & Blachman, 1991; Bradley & Bryant, 1983; Bryant et al., 1990; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002).

2.11 Educational Disadvantage and Phonological Awareness

While the positive relationship between reading development and phonemic awareness skills has been well established, socioeconomic disadvantage has been reported to delay the development of these important skills in children (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997), and, consequently, their early decoding skills (Nancollis et al., 2005). According to Torgesen et al. (1997), children who enter school with an impoverished awareness of the syllable, onset-rime, and phonemic units of sounds within spoken words are at a far greater risk of falling up to three years behind in reading acquisition by age ten compared to their peers who begin reading instruction with these skills.

A small number of research studies have examined the effects of implementing phonological awareness interventions with children from lower socioeconomic backgrounds. In their study, Raz and Bryant (1990) highlighted that socioeconomic-linked differences in phonological processing skills related strongly to later differences in word decoding skills. Locke et al.'s (2002) study found that the spoken language abilities of preschool children reared in socioeconomically deprived areas were significantly below those of the general population, despite children's cognitive abilities being comparable. One study, that is particularly pertinent in the context of this dissertation, is McIntosh et al.'s (2007) study, which investigated the language and phonological awareness skills of socioeconomically disadvantaged preschoolers. McIntosh et al. reported that preschool children from low socioeconomic backgrounds performed at levels well below the level of

their counterparts from average socioeconomic backgrounds. They highlighted that the delay experienced by children from low socioeconomic backgrounds was not a trivial delay and emphasised that these children ‘were seriously disadvantaged at school entry’ (p.279). From the above studies, we can deduce that educational disadvantage can affect children’s language skills from a very young age, yet, many would argue that early childhood is the stage where education can most effectively influence the development of children and help to reverse the impact of educational disadvantage.

Importantly, McIntosh et al.’s (2007) study also found that, despite the evidence of lower levels of language and phonological awareness skills, the introduction of a phonological awareness intervention was highly effective in improving children’s phonological awareness. The children receiving the phonological awareness intervention in the study demonstrated significant enhancement of their skills in comparison to the control group. Furthermore, the progress made by the experimental group was maintained for up to three months after the intervention concluded. It was reported that the introduction of the intervention, in McIntosh et al.’s study, led to a dramatic improvement in skills, in that children who received the programme not only did better than those in the control group, but also performed equivalently to children from average socioeconomic backgrounds. One of the benefits, therefore, of introducing phonological awareness interventions to children attending schools in areas of socioeconomic disadvantage is that by increasing an ‘at-risk’ child’s understanding of – and skill in – phonemic awareness, we may decrease the chance that the child will experience early or future reading difficulties.

To some extent the research conducted in this dissertation is comparable to the study conducted by McIntosh et al. (2007); however, a principle difference between the studies relates to the specific focus on children’s skills at the phoneme level in this study. McIntosh et al.’s study examined and provided instruction in general language development and focused on only two aspects of phonological awareness – rhyme

awareness and phoneme isolation – whereas, in this study, the programme will provide brief instruction in the broader phonological awareness skills, such as word awareness, syllable awareness and onset and rime awareness, and provide more intensive instruction at the phoneme level.

Gillon et al.'s (2007) study examined the efficacy of administering a phonological awareness intervention with children who attended a school in New Zealand with a government-defined low socioeconomic status. Twenty children (aged 5.5 – 7.8 years) participated in the study. The results indicated that the phonological awareness intervention implemented was effective in rapidly accelerating the participants' phoneme blending, segmentation, and manipulation skills and significantly improved their phonetic decoding ability.

In addition to the components of effective phonological awareness programmes described in section 2.6 of this chapter, three further instructional features need to be considered when teaching children who are identified as 'at-risk' of experiencing future reading difficulties, such as children attending DEIS urban Band 1 schools. In their research article, *Critical Elements of Classroom and Small-Group Instruction Promote Reading Success for all Children*, Foorman and Torgesen (2001) identify three crucial features of instruction that need to be put in place for children presenting as 'at-risk' of future reading difficulties. Firstly, they suggest that instruction must be *more explicit* for these children than the instruction provided in a regular classroom. Foorman and Torgesen suggest that 'most of the knowledge that is acquired in the process of "typical" reading development is discovered by the child during interactions with print' (p. 207). The more children read, the more they make further generalisations about letter-sound relationships. However, children who are 'at-risk' of experiencing reading difficulties, such as children from lower socioeconomic background, are often not exposed to print to the same degree as their peers from more affluent backgrounds, and, therefore, require a more explicit and

systematic approach to early reading instruction in order for them to acquire the skills and knowledge necessary to decode print. According to Torgesen (2002), explicit instruction is instruction that does not leave anything to chance and does not make assumptions regarding the skills and knowledge that children can acquire on their own.

The second feature of reading instruction identified by Foorman and Torgesen (2001) is that instruction must be *more intensive* for ‘at-risk’ children, because these children require more teaching and learning opportunities per day than other children in order to bridge the gaps in their knowledge. According to Hart and Risley (1995), some children are ‘at-risk’ of experiencing future reading difficulties due to a lack of instructional opportunities and access to print before they begin school. Hart and Risley acknowledge that while these children may learn at average rates, they have much more to learn than their peers who come to school with typical ‘levels of preparation’ and, consequently, require more learning opportunities to catch up with peers. More intensive instruction can be achieved in two ways: either by increasing classroom time or by providing instruction individually or in small groups.

The final feature of reading instruction for children ‘at-risk’ of experiencing future reading difficulties is ensuring that children are supported through *scaffolded* instruction. According to Stone (1989), scaffolded instruction consists of finely tuned interactions between the teacher and the child that support the child in accomplishing a task that s/he could not do without the help of the teacher. Instruction for ‘at-risk’ children should involve two types of scaffolding. The first involves careful sequencing of material so that skills are built incrementally and gradually. The second involves teacher-pupil dialogue that directly shows the child what kind of thinking is required in order to complete a task successfully. In the context of the current research, both types of scaffolding are acknowledged and implemented. The Gradual Release of Responsibility Model (Pearson & Gallagher, 1983) underpins the explicit instruction provided by the teachers in the

programme implemented in this dissertation. This model of instruction scaffolds the children's learning by shifting the cognitive work and new learning slowly and intentionally from teacher modelling, to joint responsibility between teacher and children, to the ultimate goal of the model, which is the independent practise and application of new skills by the learner. Chapter Five of the dissertation documents, in more detail, how each of the features identified by Foorman and Torgesen (2001), along with those identified by Phillips, Clancy-Menchetti, and Lonigan (2008) in section 2.6, were considered when designing and developing the explicit, teacher-led phonological awareness programme, focused at the crucial phoneme level, implemented in Study Two of this research.

2.12 Chapter Summary

This chapter highlighted the dissertation's conceptual framework: emergent literacy and suggested that the construct be seen as occurring in two stages in recognition of the shift in sociocultural contexts of learning in the transition from home and preschool (Stage One) to home and formal school (Stage Two), and the effect this transition has on approaches to instruction. The chapter also introduced phonological and phonemic awareness, and emphasised the powerful predictive nature of phonemic awareness (Adams, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002) and its causal and reciprocal relationship with reading.

In this chapter, the researcher drew attention to the difficulty young children can have in acquiring phonemic awareness as individual phonemes in spoken language are typically blended together and coarticulated in speech (Chall, 1983; Gillon, 2004; Ranweiler, 2004; Stahl & Murray, 1994) and highlighted that, as a consequence of this acknowledged difficulty, young children should also be exposed to explicit, intensive and scaffolded instruction in this crucial skill. This is particularly the case for children attending DEIS urban Band 1 schools in Ireland, as the literature reports that children from lower socioeconomic backgrounds often begin school with deficits in phonological

awareness skills. Recent national assessments of English reading (NAERM, 2014) have also reported that this particular cohort are lagging significantly behind their peers from non-DEIS schools in later reading skills. In this chapter, the researcher has argued that an explicit, teacher-led phonological awareness programme, focused at the crucial phoneme level, should be introduced in DEIS urban Band 1 junior infant classrooms, as a preventative measure, to potentially combat the later reading difficulties that are so evident and prevalent amongst this particular group of children.

3.0 Research Methods

Chapter Three begins by examining the research questions that informed and guided the research conducted in this dissertation. In section 3.3, an overview of the two studies are presented. The methodological approach, educational design research (EDR), is then discussed and the manner in which it applies to the current research is explored. As an emerging approach in educational research, time will be taken to describe EDR's features, philosophical underpinnings, phases and outputs. Section 3.7 outlines both the quantitative and qualitative research instruments that were utilized to collect data in the research studies. Section 3.8 and 3.9 of the chapter examines, in detail, the two studies at the heart of this research. The research design for each study and the participants involved are identified. This section also provides a description of the manner in which the data was analysed. Section 3.11 examines the ethical issues relating to conducting research within a classroom setting, and, the chapter concludes by reporting on the limitations of the research.

3.1 Research Questions

The research was conducted to address the following three research questions:

- 1. Do junior infant children from lower socioeconomic backgrounds begin primary school with lower levels of phonemic awareness?**

The answer to this question was important to ascertain to determine whether an intervention programme was necessary to implement in the first instance. International research has shown that children coming from lower socioeconomic backgrounds often begin formal schooling with lower levels of phonemic awareness (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al. 2002, Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997). Study One sought to examine this hypothesis in an Irish context.

2. Will the introduction of a teacher-led, explicit phonological awareness intervention, focused on the crucial phoneme level, improve the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school as indicated by performance on assessments of phoneme identity, phoneme blending and phoneme segmentation skills?

As previously mentioned in Chapter Two, section 2.5, phonemic awareness is not an intuitive or natural ability for all children to acquire as phonemes do not exist as distinct units of sound but rather as coarticulated sounds. This represents a challenge to children developing phonemic awareness. Research has shown that explicit instruction in the area of phonemic awareness can be implemented successfully to develop children's phonemic awareness skills which, in turn, improves subsequent beginning reading skills, such as decoding (Adams, 1990; Pufpaff, 2009).

3. What are the characteristics of an effective phonological awareness programme implemented to positively affect junior infant children's phonemic awareness skills in a DEIS urban Band 1 school in Ireland?

The third research question reflects the need for researchers, who implement intervention programmes, to not only examine whether their programme has worked but to also examine 'how' and/or 'why' it worked or did not work. As the research approach adopted in this dissertation is educational design research (EDR), the characteristics of the programme itself and how it was designed and implemented are of great importance. This final research question embodies the approach of educational design research, where the wording of the research question always implies a search for the effective characteristics of an implemented intervention programme in order to advance theory.

3.2 Personal Statement

Having worked for many years in a DEIS urban Band 1 primary school, I witnessed, first hand, the impact of children's backgrounds on their reading levels. Each

year, the results of standardised tests would highlight the disparity between the reading levels of those attending DEIS schools and those attending non-DEIS schools. Although a number of literacy interventions were in place in my school – Reading Recovery, First Steps, team-teaching – I felt that such interventions were being implemented too late in the development of children’s reading. The gap had already become visible not just to teachers but to the children themselves, and, by senior infants, children were referring to themselves as ‘bad’ or ‘poor’ readers. While embarking on a masters’ degree in literacy, I became interested in the area of phonemic awareness and its potential as a predictor of children’s later reading abilities. This new-found knowledge made me reflect on my own teaching of this important skill, and I found it was an area of literacy that I had put little emphasis on. I also discovered that there were very few resources available to support my teaching in an Irish context.

While working at third level, I have experienced teachers’ dearth in content knowledge in the crucial area of phonological awareness. Having conducted numerous summer courses and seminars with practising teachers, I have seen them wrestle with confusing terminology such as ‘phonological awareness’, ‘phonemes’, ‘phonemic awareness’, and ‘phonics’. On many occasions, teachers have confused phonemic awareness with phonics instruction, and terms such as ‘phonological awareness’ and ‘phonemic awareness’ are often used interchangeably by teachers. So, while a huge body of work needs to be done in relation to teachers’ content knowledge in this crucial area, it was important for me, as a researcher, in the first instance, to establish whether the implementation of a phonological awareness intervention ‘works’. Once established, further work can be done on disseminating the intervention to teachers and ensuring that they become more ‘aware’ of this important emergent reading skill.

3.3 Overview of the Research

This dissertation consists of two studies. In the first study, the phonemic awareness skills of one hundred and seven junior infant children from a DEIS urban Band 1 school (n=67) and a non-DEIS school (n=40) were assessed during their first year of formal schooling. An iPad-based phonemic awareness assessment tool was used to empirically measure the children's phonemic awareness skills at the beginning of the school year. This first study was important to conduct to determine whether Irish children from socioeconomic disadvantaged backgrounds begin school with lower levels of phonemic awareness as alluded to in the international research (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997).

Study Two adopted a pragmatic, mixed-methods research approach and employed educational design research (EDR) as a methodology. This study required junior infant teachers, in a DEIS urban Band 1 school, to implement an explicit and systematic phonological awareness programme, focused at the crucial phoneme level. The programme was short-term and ran for 14 weeks between October and January. The teachers received professional development from the researcher in the area of phonological and phonemic awareness prior to the implementation of the programme. This study comprised of a quasi-experimental, pre-test/post-test design and incorporated a mixed-methods approach, which involved collecting and analysing both quantitative and qualitative data. Similar to the first study, the children were assessed using the iPad-based phonemic awareness assessment tool and were assessed at three intervals during their first year of formal schooling – September, January and June. A complete summary of the timeline of the research can be found in Appendix A.

3.4 Philosophical Approach: Pragmatism

Willis (2007) explains that a paradigm is ‘a comprehensive belief system, world view, or framework that guides research and practice in a field’ (p.8). In essence, a paradigm is the lens through which the researcher looks at the world. The pragmatic paradigm advocates that there is no single view of reality and individuals hold their own unique interpretation of what reality means to them. Pragmatists acknowledge that, at some stages, their research will take an objective approach by not interacting with subjects, while, at other stages, it will be necessary to take a more subjective approach by interacting with research subjects in order to construct realities (Teddlie & Tashakkori, 2009). For the most part, pragmatists give less influence to philosophical assumptions for the conduct of research methods and, consequently, pragmatic researchers are less restricted in terms of how they carry out research, as they consider ‘what works’ to best answer research questions (Johnson & Onwuegbuzie, 2004; Onwuegbuzie & Johnson, 2006). The research in this dissertation was conducted within a pragmatic paradigm, as it examined the ‘workability’ of an phonological awareness programme in its natural context: the classroom.

Although over 100 years old, pragmatism has seen a revival as a research approach within the field of education in the last decade (Dickstein, 1998). The research conducted in this dissertation advocates the spirit of the pragmatic tradition rather than supporting the approach of any one theorist. Such a spirit advocates that theories are judged not by their claims to truth, but by their ability to do work in the real world (Dewey, 1938). While a positivist approach aims at getting things *right*, pragmatic researchers place an emphasis on clarifying meanings and looking for ‘conceivable practical consequences’ (Pierce, 1905, p.494), with the concept of ‘truth’ arising from such consequences. Rorty (1999) argues that ‘we cannot regard truth as a goal of inquiry. The purpose of inquiry is to achieve agreement among human beings about what to do, to bring consensus on the end

to be achieved and the means to be used to achieve those ends' (p. xxv). Consequently, from a pragmatic perspective, ultimate knowledge is knowledge that works. To reflect such a spirit, the aim of this research was not to search for a universal truth or law-like rules, but to explore what might work for teachers and children within the context of their own classrooms.

A further assumption of pragmatism is that we are socially and historically situated, and the study of practices in context is of great importance within a pragmatic tradition. Dewey staunchly believed that 'the home, the school, the shop, the bedside and hospital, present such problems as truly as does the laboratory' (p. 273). As a result, pragmatic inquirers conduct practical research in its natural context and draw from both quantitative and qualitative methods to best understand the intended consequences. As an empirical positivist approach has been such a dominant feature of reading research (see section 3.4.1), the researcher of this dissertation would contend that this has led to a separation of research from classroom practice because often such research has been confined to laboratory-like environments that do not take cognisance of the complexities of learning to read in classroom settings. Research, such as that carried out in this dissertation, conducted within the pragmatic tradition, attempts to combat this by ensuring that research, while empirical, is also grounded within its natural context.

3.4.1 Reading research. Early research in reading, like much educational research prior to the 1960s, lacked paradigmatic diversity and was, primarily, characterised by the classical, empirical scientific paradigm that sought to capture the 'truth' about reality. This dominant paradigm continued into the 1980s, with reading research being grounded in cognitive science, which adopted positivist methodologies. There is little argument that, whilst dominant, this paradigm moved the field of reading research forward; however, it failed to address the complexity of learning to read in complex classroom environments.

In the late-1960s, the field of reading research began to experience a transformation. Interestingly, this transformation did not come from within the reading research community itself, but, instead, was due to researchers from other disciplines – developmental psychology, speech pathology, linguistics – showing an interest in researching the reading process. Each discipline brought with it its own research methods that supported its own individual paradigms. Reading research, therefore, came to be considered a transdisciplinary field (Pearson & Stephens, 1994). This led to a proliferation of methods and approaches to studying the field of reading; however, the danger with being transdisciplinary is that this can lead to incompatible assumptions and methodologies and little common language for dialogue and discourse. Indeed, as has already been discussed in Chapter Two, section 2.2.2, which highlighted the confusion that exists within the area of phonological awareness, emanating from the lack of a consistent definition for both phonological awareness and phonemic awareness. Therefore, within the reading research community we now have a multiplicity of voices emanating from sometimes incompatible paradigms (Clay, 1994; Mosenthal, 1985). Chall (1998) contends that the danger of such a plethora of research studies is that their findings often have little impact on pedagogy or on solving literacy problems.

On a more positive note, the result of this multiplicity of voices, in the past three decades, has been that the predominantly positivist approach to investigating literacy interventions has shifted and researchers are now adopting more qualitative and descriptive methods – alongside quantitative methods – in an attempt to determine not only whether a programme/intervention has worked but also to deepen their understanding of ‘how’ or ‘why’ it has worked in its natural environment. Such investigations require a more intimate knowledge of learners, teachers and classroom processes than quantitative methods alone can determine.

Whilst more pragmatic approaches to reading research are making inroads, the positivist approach still remains dominant. Shannon (1989) examined and categorised abstracts from over 700 research studies from *Reading Research Quarterly* (RRQ) and the *Journal of Reading Behaviour* (JRB) (two publications that are to the forefront in reading research) and found that 97% of articles published in the RRQ could be classified as empirical, scientific studies, while 99% of the studies published in the JRB could also be classified as empirical, scientific studies. Therefore, while the field of reading is benefitting from more pragmatic approaches to research, more needs to be done to establish a more pragmatic approach within reading research. Such an approach focuses reading researchers on defining reading problems, determining how best to solve them in their natural setting, and ensuring that the results inform future practice.

3.5 Methodological Approach: Educational Design Research

*“One must learn by doing the thing, for though you think you know it,
you have no certainty until you try”*
(Sophocles, as cited in Rogers, 2003, p. 168)

It has been argued that educational design research (EDR) is an appropriate methodological approach to adopt for research that calls for the design and development of intervention programmes (Van den Akker, 1999; Barab & Squire, 2004; Wademan, 2005). The following subsections begin by discussing the historical roots and goals of EDR. As this is an emerging approach, time will be taken to define EDR and to highlight its key characteristics and features. Models of EDR are then discussed and the phases involved in conducting EDR will also be highlighted. This section concludes by outlining the anticipated outputs of EDR and a discussion on the limitations of the approach is also presented.

3.5.1 Historical roots of educational design research. The first decade of this century has seen the emergence of a new research approach for education: educational design research (EDR). EDR focuses on the study of learning in authentic contexts

through the design and study of instructional intervention programmes (Brown, 1992; Collins, 1992). According to Anderson & Shattuck (2012), EDR is an approach designed by and for educators, and seeks to increase the impact, transfer, and translation of educational research into improved practice. In addition, it stresses the need for theory building and the development of design principles that guide, inform, and improve future practice and research in educational contexts.

Design-based research dates back to 1992, when the American psychologist Anna Brown published an article in the *Journal of the Learning Sciences* on introducing innovations from the field of educational technology into lessons (Brown 1992). Although it now exists in many guises (eg. educational design research, design experiments, formative research, development research), the term ‘design-based research’ was first coined by the Design-Based Research Collective, which was established in 1999. The approach emerged in response to the supposed detachment of research from practice (Lagemann & Shulman, 1999) and a growing frustration with the lack of impact research was having on classroom practice. From a research perspective, questions regarding the limitations of the dominant empirical paradigm were being asked and there was a call for more ecologically valid studies to be conducted. The Design-Based Research Collective (2003) argued that ‘educational research is often divorced from the problems and issues of everyday practice – a split that results in a credibility gap, which creates a need for new research approaches that speak directly to problems of practice and that lead to the development of ‘usable knowledge’ (p. 9). This led to the conclusion that research paradigms that examine learning processes as isolated variables within laboratory settings, can lead to an incomplete understanding of learning processes in more naturalistic settings (Barab & Squire, 2004). Therefore, EDR aims to develop evidence-based claims, emerging from naturalistic investigations, which result in knowledge about how people

learn in order to directly affect practice, while also advancing theory that might be of use to others.

EDR has been defined as ‘the systematic study of designing, developing and evaluating an educational intervention with the aim of solving a complex educational problem and to advance our knowledge about the characteristics of these interventions and the processes used to design and develop them’ (Plomp, 2007). McKenney & Reeves (2012) provide an even more explicit definition of EDR as ‘ a genre of research in which the iterative development of practical *solutions* to complex educational problems also provides the context for empirical investigations that yield theoretical *understanding* that can inform the work of others’ (p.17). Unlike the predominant positivist paradigm in educational research, EDR recognises the value of an approach that not only identifies the complexity of the learning *process* but also sheds light on the complexities of the learning *context*. Researchers adopting this approach aim to develop interventions/programmes that can be used in practice, but which are also empirically underpinned solutions to identified problems.

According to Richgels (2001), the last two decades can be characterised, without much exaggeration, as the ‘Age of Phonemic Awareness’. Research studies have demonstrated that phonemic awareness is a crucial precursor to and predictor of later reading achievement, yet, international research has reported that teachers’ content knowledge in phonemic awareness is inadequate and many teachers do not deliver instruction to children in this vital area (Bos et al., 2001; Brady & Moats, 1997; Dickinson & Brady, 2005; Moats & Foorman, 2003; Phillips et al., 2007; Zill & Resnick, 2006). Furthermore, in terms of the current research, from working with the teachers involved in this study, and from the researcher’s own anecdotal evidence, it would appear that Irish teachers lack knowledge of what phonemic awareness is and its importance in the early stages of reading. This is perhaps why interventions that are applied and investigated in

more controlled laboratory settings do not readily transfer to the classroom and perhaps why literacy research has made less difference in practice than would have been hoped (Dillon, O'Brien & Heilman, 2000). The pragmatic nature of EDR attempts to close this research-practice divide by encouraging researchers to work with practitioners in their natural environment to develop, implement and evaluate 'useable' interventions.

Informed by research and a review of relevant literature, researchers who embrace EDR create and develop practical interventions/programmes by carefully studying what already works. A careful analysis of existing programmes in combination with reviewing relevant literature generates ideas for new design tasks. The important focus for EDR, however, is that the process is achieved through collaboration between both researcher(s) and practitioner(s). As Barab and Squire (2004) state, practitioners 'are not 'subjects' assigned to treatments but instead are treated as co-participants in both the design and even the analysis' (p.3).

While EDR may sound akin to action research, as they share many epistemological, ontological and methodological underpinnings, there are two essential differences between these approaches. Firstly, action research is not aimed at generating design principles/theories that further our knowledge of the implementation of interventions in educational settings. These design principles will be elaborated on in more detail when discussing the outputs of educational design-based research in section 3.5.5. Secondly, action research is normally carried out by a practitioner and does not benefit from the rich collaboration between the practitioner and the domain-specific expert researcher.

3.5.2 Features of EDR. Researchers have proposed a range of features that need to be present in EDR. In their article, *Design-Based Research: A Decade of Progress in Education Research?*, Anderson & Shattuck (2012) synthesised these features and proposed six features that were typical of EDR. These features are as follows:

- **Research situated in a real educational context:** EDR must take place in authentic, educational settings. Ann Brown (1992), the researcher who pioneered EDR, argued that research relating to learning needs to occur in real classrooms with real children and real teachers who are provided with professional learning support.
- **Focuses on the design and evaluation of a significant intervention programme:** the design of an intervention programme begins with an accurate assessment of the local context; is informed by relevant literature, theory and practice from other contexts; and is designed specifically to overcome some problem or create an improvement in local practice. Throughout its implementation, an intervention programme is reflected upon and assessed, both formatively and summatively, by both the teachers delivering it and the researcher.
- **Use of mixed methods:** the choice of methods and the focus on authentic and meaningful problems resonates with pragmatic philosophy. While quantitative methods can be adopted to test the effectiveness of an intervention, the recognition of the importance of the context requires the implementation of more descriptive qualitative methods to examine how or why an intervention has/has not worked.
- **Involves multiple iterations:** EDR requires the creation and evaluation of an intervention programme and its continuous evolution as it is evaluated in authentic practice. EDR intervention programmes are rarely, if ever, designed and implemented perfectly when they are first introduced. There is always room for improvement, reflection and evaluation. The research, therefore, incorporates cycles of analysis, design, development, implementation and evaluation (see section 3.5.4).
- **Involves a collaborative partnership between researcher(s) and practitioner(s):** while the researcher may have specific content knowledge, the

classroom teacher has knowledge of the needs of his/her children, the learning context and the politics of the educational system within which they are operating. It is hoped that a collaborative process can address the research-practice divide by producing an intervention programme that is supported by research literature but also arises from and addresses the complexities of classroom practice.

- **Creation of design principles:** an integral aspect of EDR is that designs lead to the development of practical design principles. Design principles reflect the conditions in which they operate and, therefore, the design is conceived not just ‘to meet local needs, but to also advance a theoretical agenda, to uncover, explore, and confirm theoretical relationships’ (Barab & Squire, 2004, p. 5).

3.5.3 Stakeholders in EDR. In EDR, stakeholders play an integral, collaborative role in the development and evaluation of intervention programmes. Stakeholders are considered to be the groups or individuals who either have the power to affect, or are affected by, the programme being implemented. In the context of the current research study, the four participating junior infant teachers of the experimental group of children were considered the main stakeholders and are termed the teacher-expert group for the remainder of the dissertation. Over the course of the design, delivery and implementation of the intervention programme, the teacher-expert group were heavily involved throughout.

While the initial problem was identified by the researcher (ie. the gap in reading levels between children attending DEIS urban Band 1 schools and their counterparts in non-DEIS schools), the teacher-expert group reinforced the researcher’s concerns and confirmed that they had identified such problems themselves. Therefore, in an attempt to provide a solution to the identified problem, the researcher and teacher-expert group worked closely together through each EDR phase, evaluating and redeveloping the phonological awareness programme where and when necessary.

Other important stakeholders included the school principal and members of the wider school community (for example Learning Support Teachers, Resource Teachers and Special Needs Assistants). The next section explores models of EDR that have contributed to our understanding of this emerging approach to educational research.

3.5.4 Models of EDR. Researchers may vary in the details of what they understand EDR to be, however, they all agree that such research comprises of a number of distinct phases. Therefore, researchers in the area of EDR have reached a consensus on the broad phases involved in EDR – analysis, design, development, implementation and evaluation (see Figure 3.1).

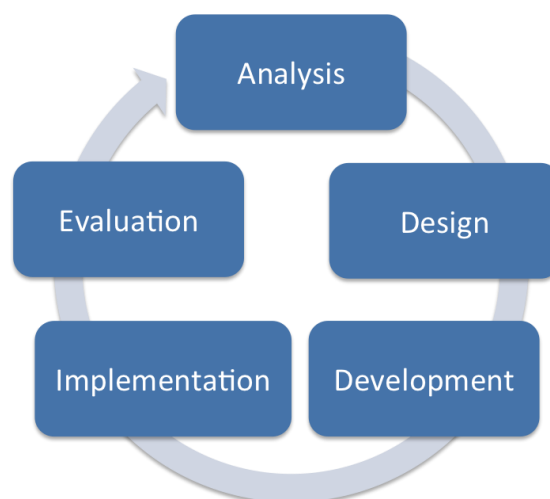


Figure 3.1 The Five Phases of Educational Design Research

In general, the EDR process begins with the identification of the educational problem. This is followed by an analysis of the specific context within which the intervention programme is to take place and a comprehensive review of the research literature is conducted. During the analysis phase all available knowledge of existing intervention programmes are reviewed and potential solutions to the educational problem at hand are explored. In the development phase, in collaboration with practitioners, the intervention programme is designed with a strong consideration of the educational context

in mind. During the implementation phase, the process of implementing the intervention programme is considered in collaboration with the practitioners. In the evaluation phase, data is gathered to determine the effectiveness of the implemented intervention programme and its 'useability' within the learning context. This data is gathered from both formative and summative forms of assessment. During the evaluation phase, the collaborators reflect on and consider 'design principles' that have emerged from the implementation of the programme. It should be noted that these phases are not linear in nature but are cyclical, as the evaluation phase should lead to the redesign or redevelopment of aspects of the intervention programme, which may also involve further exploration.

Over the last two decades, a number of influential models have contributed to the identification of these phases. Verhagen's (2000) model, below, was adapted from an earlier model by Plomp (1982). Verhagen emphasised two key phases in his model. Firstly, he highlighted the need to consider how an intervention programme was to be implemented from the very outset and to consider it throughout each phase. This consideration emphasised the importance of the practical nature of EDR. Secondly, Verhagen emphasised the need to evaluate even from the initial problem and analysis phase. Verhagen also believed that the evaluation process should move from formative to more summative approaches as the design matured. Figure 3.2 represents Verhagen's model of EDR.

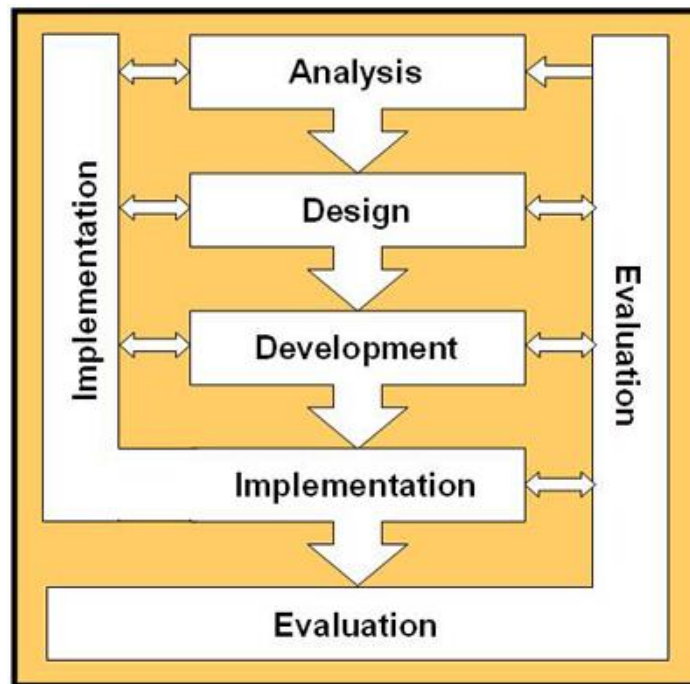


Figure 3.2 Verhagen's (2000) Model of EDR

In 2006, Reeves presented a model, built upon Verhagen's, which consisted of four phases of EDR. In a departure from Verhagen's model, Reeves' (2006) model (see Figure 3.3) emphasised the necessity for collaboration between researcher(s) and practitioner(s). In Reeves' model, we see a change in the language used in relation to EDR. He refers to the identification of 'problems' and the development of intervention programmes that provide 'solutions' to these identified problems. Reeves also refers to the production of 'design principles' as part of the reflection phase – a critical component of EDR.

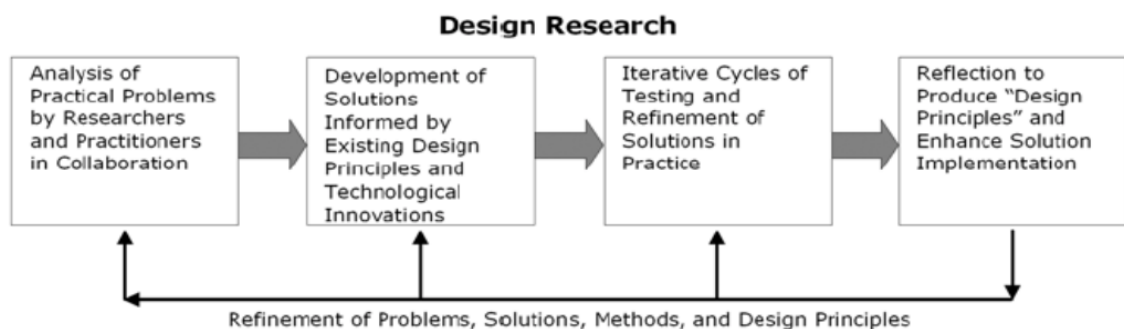


Figure 3.3 Reeves' (2006) Model of EDR.

The most recent and most comprehensive model of EDR comes from the collaboration of McKenney and Reeves (2012). They provided, what they term, a generic model for EDR (see Figure 3.4).

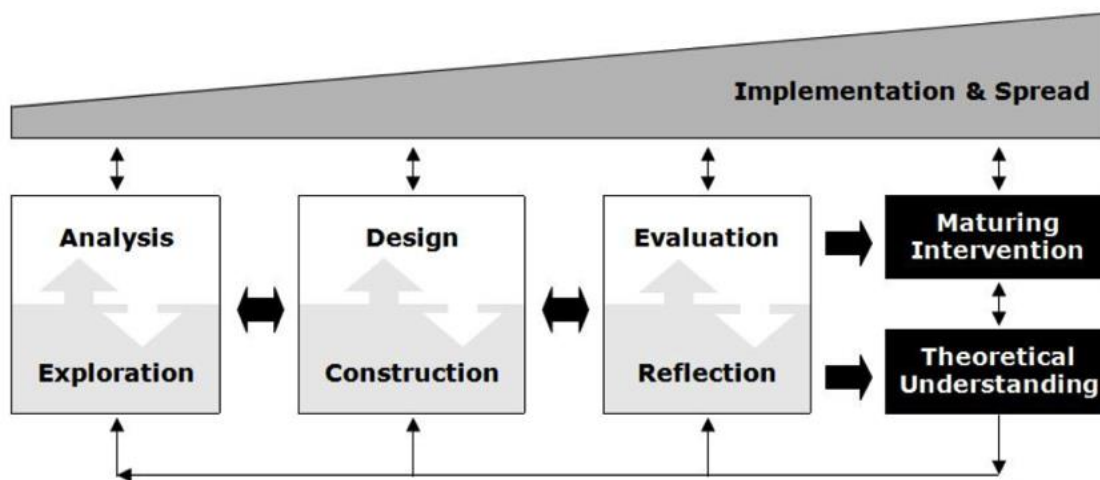


Figure 3.4 McKenney & Reeves' (2012) Generic Model of EDR

In this model we can see the phases involved in the EDR process and the influence they have on one another. The analysis and exploration phase includes the analysis of the research literature to identify previous effective intervention programmes, but also involves an exploration of the context within which the intervention is to take place. During this phase, collaboration with practitioners is sought 'to shape a better understanding of the educational problem to be addressed, the target context, and stakeholder needs' (McKenney & Reeves, 2012, p. 78-79). The second phase, design and construction, refers to the exploration and construction of solutions to the educational

problem posed. In this phase, the solution will generally be the design and construction of an intervention programme or resource to be implemented. The evaluation and reflection phase evaluates the implementation and effectiveness of the intervention and, finally, there is a focus on ‘meaning making’, with such reflection resulting in the creation of design principles. As can be seen in Figure 3.4, as the phases progress, more emphasis is placed on implementation and the spread depicts the greater dissemination and diffusion of the intervention programme. There are two endpoints to the process: the production of a intervention programme that has been designed and implemented in a practical context and, in the form of design principles, a contribution to future theoretical understanding. These two outputs of EDR are discussed, in more detail, in the next section.

3.5.5 Outputs of EDR. There are two principle outputs of educational design research. These outputs include the creation of practical contributions to educational problems, such as the creation of intervention programmes, and the development of ‘design principles’, which lead to enhanced theoretical understanding. The professional development of the practitioners involved in EDR was a secondary output of this research approach.

3.5.5.1 Design principles. The creation of design principles is one of the features of EDR that differentiate it from other research approaches such as action research. In EDR, the emphasis is not only on whether an intervention programme works in a particular context but also determining how and/or why it works. By doing so, the researcher contributes to the field by developing design principles that produce further knowledge for future researchers. This is achieved through systematic reflection and analysis of the data collected during the process of implementation. Proponents of EDR state that the final stage of each design research project should consist of systematic reflection and the production of design principles (Van den Akker 1999; Reeves, 2000, 2006).

3.5.5.2 Practical contributions. An essential feature of EDR is the development of solutions to problems of practice. The implementation of intervention programmes is often recognised as a solution to solving educational problems. These programmes constitute the main practical contribution of EDR. Such intervention programmes are designed for actual use, implemented by practitioners in authentic settings with the goal of solving real educational problems. As is the case in the research conducted in this dissertation, intervention programmes are often co-constructed by the researcher and teachers working closely together. The end result of this process is the availability of an intervention programme that ‘works’, in that it has been co-constructed by teachers, implemented in real classroom environments and evaluated for its effectiveness. It is envisioned that the current research will result in the availability of a phonological awareness programme, focused at the crucial phoneme level, that is suitable to implement with children attending Irish DEIS urban Band 1 schools.

3.5.5.3 Professional development of practitioners. A secondary output of EDR is the professional development teachers receive due to the collaborative nature of EDR. The participation of teachers in EDR should be seen as an important form of professional development. If teachers are to be considered co-constructors and implementors of an intervention programme, professional development may be required prior to the implementation phase. In this current research, the researcher provided all of the experimental group teachers with two two-hour professional development sessions prior to implementing the phonological awareness programme, as the teachers, themselves, had identified gaps in their knowledge in this area. Furthermore, the researcher of this current dissertation contends that professional conversations between the researcher and the teachers regarding the continual evaluation and co-construction of the programme, has the potential to lead to teachers’ content knowledge becoming more embedded and sustained during the long-term implementation of the intervention programme.

This view of teachers' continuous professional development (CPD) held by proponents of EDR is supported by the extensive research literature on CPD. Villegas-Reimers (2003) contends that CPD should be considered a long-term process, while Snow, Burns and Griffin (1998) argue that teachers of literacy require 'ongoing support from colleagues and specialists as well as regular opportunities for self-examination and reflection' (p.331). There has also been a renewed interest in CPD that situates teachers' continuous development on-site and within regular classrooms. According to Kinnucan-Welsch, Rosemary and Grogan (2006), school-based professional development provides a forum for debate amongst teachers and can transform schools into professional and inquiring communities.

3.5.6 Rigour in EDR. According to Reeves (2011), EDR must seek to balance rigour and relevance; however, as with any other research methodologies, EDR faces challenges that potentially threaten the rigour of its findings (Design-Based Research Collective, 2003; Plomp, 2007). As EDR is centrally concerned with context, this concern carries with it a variety of methodological implications and challenges that, to date, researchers and practitioners of design research have only partially managed to address.

As the research conducted as part of EDR is generally viewed as empirical research (ie. EDR strives to assess the efficacy of implementing an intervention programme), EDR researchers are required to meet and apply the guiding principles for scientific research in order to maintain the necessary rigour in their findings (Plomp, 2007; Wang & Hannafin, 2005). Plomp (2007) suggests adopting Shavelson and Towne's (2002) six guiding principles that underlie all scientific inquiry. These principles suggest that a researcher should

- Pose significant questions that can be investigated empirically
- Link research to relevant theory
- Use methods that permit direct investigation of the question

- Provide a coherent and explicit chain of reasoning
- Replicate and generalise across studies
- Disclose research to encourage professional scrutiny and critique (pp. 3-5).

With regard to achieving objectivity, this is not an easy task within EDR as researchers usually, if not always, immerse themselves in the research context and interact intensely with participants. However, utilizing triangulation and using multiple kinds of data can increase the objectivity in the findings of EDR (Design-Based Research Collective, 2003; Wang & Hannafin, 2005). The use of triangulation also contributes to the improved reliability of the findings in EDR.

Issues regarding the validity of EDR studies are complex. As EDR is considered highly contextualised research, ensuring the external and internal validity of such studies is problematic. Consequently, the findings of EDR ‘cannot be generalised from a sample to a larger population’ (Barab & Squire, 2004; Plomp, 2007) and this is one of the greatest limitations of EDR. However, the ecological validity of EDR studies is high as the setting of the study approximates to the real world that is under examination. A further discussion on the limitations of this research methodology is presented in section 3.12.

EDR is committed to developing theoretical insights and practical solutions in real-world contexts, in collaboration with stakeholders. EDR has received a significant amount of attention in recent years, primarily in reaction to the failure of more traditional research approaches to reduce the research and practice divide. EDR aims to ‘address complex problems in educational settings (Sari & Lim, 2012, p. 2) in order to ‘build a stronger connection between educational research and real-world problems’ (Amiel & Reeves, 2008, p. 34). EDR researchers work hand in hand with teachers to create, implement and evaluate intervention programmes in order to bring about change. It is for these reasons that the researcher of this dissertation has adopted EDR as the methodological approach.

3.5.7 EDR in context of current research. The following diagram (Figure 3.5)

represents how the current research aligns with the phases of EDR.

EDR phases	Current Research
<p>Phase 1 Analysis and exploration of the practical problem</p>	<ul style="list-style-type: none"> • Determine whether children from lower SES backgrounds begin school with lower levels of phonemic awareness? • Identify solutions to time-consuming nature of phonological awareness assessments
<p>Phase 2 Development of solutions informed by existing design principles</p>	<ul style="list-style-type: none"> • Creation of an explicit, teacher-led phonological awareness programme, focused at the crucial phoneme level • Creation of an iPad-based phonemic awareness assessment tool
<p>Phase 3 Refinement of solutions in practice through reflection and evaluation</p>	<ul style="list-style-type: none"> • Implementation and refinement of a teacher-led, explicit phonological awareness programme • Implementation of an iPad-based phonemic awareness assessment tool to assess children's phonemic awareness
<p>EDR outputs</p>	<ul style="list-style-type: none"> • Production of an explicit, teacher-led phonological awareness prevention programme, focused at the crucial phoneme level • Production of an iPad-based phonemic awareness assessment tool

Figure 3.5 Alignment of the EDR process and the current study

3.6 Mixed Methods

Historically, it has not been deemed appropriate to combine quantitative and qualitative research methods due to the different philosophical positions and paradigms underpinning each. This has led to what is referred to as the ‘incompatibility theory’ (Lincoln & Guba, 1985), where quantitative research is associated with a positivist paradigm, and qualitative research is subjective and involves the construction of knowledge. However, in 1988, Howe put forward his ‘compatibility thesis’, which contended that within a pragmatic philosophy both quantitative and qualitative methods could be used together. He suggested that a pragmatic philosophy that embraced mixed methods could allow for the flexibility ‘of the epistemological over the practical, of the conceptual over the empirical’ (Howe, 1988, p. 13). Creswell (2007) supported Howe’s stance when he remarked that pragmatic research supports ‘not just what works but also emphasises the research problem and uses all approaches available to understand that problem’ (p. 10). In their article *Toward a Definition of Mixed Methods*, Johnson, Onwuegbuzie and Tumer (2007) define mixed methods as ‘the type of research in which a researcher or team of researchers combine elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration’ (p. 14).

The methodology chosen for this research is a mixed-methods approach and this section examines mixed methods in more detail. Section 3.6.1 outlines the main principles of quantitative research, and, in particular, quasi-experimental research, as this dissertation incorporated a quasi-experimental design to determine gains in children’s phonemic awareness skills. Section 3.6.2 will describe qualitative research, incorporated into this research to explore ‘how’ and ‘why’ the phonological awareness programme implemented in this dissertation did or did not work for those implementing it. A rationale for choosing a mixed-methods approach is discussed in section 3.6.3.

3.6.1 Quantitative research. Quantitative research can be defined broadly as empirical research into a social phenomenon that tests a theory consisting of variables. These variables are then measured with numbers and statistically analysed in order to determine if the theory explains or predicts phenomena of interest (Creswell, 1994). Quantitative research is informed by a positivist paradigm that looks objectively at the social world and seeks to develop explanatory universal laws in social behaviours by statistically measuring what it assumes to be a static reality.

In the past, studies examining reading interventions have focused predominantly on experimental, quantitative methods to determine the efficacy of interventions. Such studies were often performed in highly controlled, laboratory-like settings using pre/post test designs. While such studies have contributed greatly to our understanding of the reading process, they also have their limitations. Due to the decontextualised nature of many quantitative studies, some researchers have argued that the results from such studies do not influence classroom practice as much as one would have hoped. This is partly due to the fact that reading studies that take place in controlled, laboratory-like settings, do not take into account the many variables that exist in busy classroom environments. Furthermore, the results from quantitative studies cannot explain the reasons for the results obtained.

According to Brown (2011), there are four main types of quantitative research: exploratory, descriptive, experimental, and quasi-experimental. The quantitative approach adopted to determine the effectiveness of the implemented phonological awareness programme was a quasi-experimental approach. The rationale behind choosing this type of research is discussed in the next section, along with a description of the nature of quasi-experimental research.

3.6.1.1 Quasi-experimental research. A quasi-experimental, pre/post test design was employed to measure the effectiveness of the phonological awareness programme

implemented in this research. Quasi-experimental research is conducted to determine relationships, effects, and causes in an educational setting (Creswell, 2005) and employs quantitative methods, with numbers representing scores that are collected on tests. This research design is commonly used in educational research that is attempting to test the efficacy of a particular intervention programme.

While an experimental approach to quantitative research is often seen as the best method to choose when establishing cause-effect relationships, this is often not possible to implement in educational research that is classroom-based, as random sampling of participants is not always possible. This leads to limitations regarding the generalisability of research results in quasi-experimental studies (see section 3.12.1). As a result, in quasi-experimental studies, the researcher must work with non-equivalent groups. This can also lead to issues relating to experimental error, such that the observed results might not be due to the target variable. To decrease experimental errors when working with non-equivalent groups, the researcher must take into account group differences and attempt to match, as much as possible, participants in the control and experimental groups.

In the current research, a phonological awareness programme was introduced at a single point in time to one group, for which there is also a pre- and post-test evaluation period. The pre- and post-test differences between the two groups were then compared. In this design, the researcher identified a control group that was similar in age and gender to the experimental group, and both groups attended the same school; however, the control group can never be exactly the same as the experimental group, and, thus the term non-equivalent is important to use to clarify that there are inherent differences between the two groups.

Quasi-experimental designs often make use of symbols to indicate the experimental procedure. The research design of Study Two is represented as:

G1 01.....02, 03 (JI school year 2015)
G2 01.....X.....02, 03 (JI school year 2016)

G1 = Control group

G2 = Experimental group

X = Intervention programme

O1 = Pre-instruction assessment

O2 = Post-instruction assessment

O3 = End-of-school-year assessment

JI = Junior Infants

While it is possible to conduct quasi-experimental research in such a way that cause and effect can be linked, it is important to state that the results of a quasi-experimental study cannot be interpreted or generalised as readily as an experimental design.

3.6.2 Qualitative research. Creswell (2007) defines qualitative research as ‘an enquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting’ (p. 2). Unlike the positivist paradigm, which views reality as objective and measureable, the interpretivist paradigm aims to understand phenomena through the meanings that people assign to them. While it was considered important to empirically test the efficacy of the phonological awareness programme, the researcher also wanted to establish the efficacy of the programme for those who were implementing it: the class

teachers. Therefore, a more subjective approach was required that involved interacting with the class teachers in order to get a glimpse into their ‘reality’ and explore the views, experiences, beliefs and motivations of the teachers.

Qualitative research makes use of multiple data collection methods such as photographs, interviews, and ethnographic prose, amongst others, to capture the subjective experiences of individuals in naturalistic settings. As qualitative researchers make use of first-person accounts to capture such phenomena, this was considered an appropriate research approach to take to capture the teachers’ views, experiences and dispositions towards the implemented programme. The data collection methods, in this research, included the use of documentary sources and focus-group interview. These methods are described in more detail in section 3.7

3.6.3 Rationale for and advantages of choosing a mixed-methods approach. A mixed-methods approach was chosen by the researcher as pragmatic researchers call for ‘epistemological ecumenism’ (Onwuegbuzie, 2002, p. 518), and believe that the best research methods are those that solve the problems posed by their research questions. In this dissertation, quantitative data collection was required to establish whether

- children from lower socioeconomic backgrounds begin school with lower levels of phonemic awareness
- the implemented phonological awareness programme was successful in improving junior infant children’s phonemic awareness skills

However, the researcher also wished to investigate whether the implemented programme worked for those implementing it: the class teachers. Regardless of whether the programme improved the children’s phonemic awareness skills or not, if the teachers found it too onerous or cumbersome to implement, they would not be likely to replicate it into the future. Therefore, qualitative data collection methods were employed to provide a deeper insight into the teachers’ views, experiences and dispositions towards the

phonological awareness programme. In the context of this dissertation, both qualitative and quantitative research methods were employed to address and understand the research questions more completely, and to ensure the methodology was responsive to the complexity of the current research undertaken in an authentic educational setting.

Denzin (2009) highlights a further benefit of using a mixed-methods approach when he stipulates that by using multiple methods, the strengths of one method can offset the weaknesses associated with another, and this, in turn, leads to more in-depth and reliable research. Such a procedure is known as ‘triangulation’, which was defined by Denzin (2009) as ‘the combination of methodologies in the study of the same phenomenon’ (p. 291). Triangulation enables the exploration of the research questions from multiple angles and allows for a more robust description of the implementation of the programme while also allowing for the collaborative participation of the principle stakeholders, eg. class teachers. According to Morse (2003), by combining the number of research methods used within a research study, we are able to broaden the dimensions and hence the scope of our research. Creswell (2005) also argued that qualitative and quantitative research “used together produce more complete knowledge necessary to inform theory and practice” (p. 39). By using more than one method within a research study, we are able to obtain a more complete picture of human behaviour and experience. Therefore, a further rationale for using mixed methods was to better understand the research questions by triangulating numeric data from quantitative research with the rich detail of descriptive qualitative research.

3.7 Research Instruments

Quantitative research instruments were utilized by the researcher to analyse the effectiveness of the implemented phonological awareness programme; however, as educational design research also aims to examine ‘how’ and ‘why’ intervention programmes work, or do not work, more qualitative research instruments were required to

determine ‘how’ and ‘why’ the programme worked, if indeed it did, for those implementing it. To enable the researcher to gain a more in-depth understanding of the phenomenon under investigation, qualitative research makes use of a variety of research instruments and data collection strategies. For the purposes of this dissertation, teacher logs, monthly progress reports, and focus-group interview were employed. Reflecting the use of a mixed-methods approach, the use of different research instruments afforded the researcher the possibility to build on the strengths of each type of data collected and minimised the weaknesses of a single approach. The research instruments adopted in this dissertation are described, in more detail, in the next sections.

3.7.1 Quantitative Research Instrument: iPad-based phonemic awareness assessment tool. Phonemic awareness assessments are an important part of any research that aims to investigate children’s development of phonemic awareness skills. In order to empirically test the efficacy of the phonological awareness programme, and to address the shortcomings of more traditional paper-based phonological awareness assessments (see Chapter Two, section 2.7), an iPad-based phonemic awareness assessment tool was created by the researcher and used to assess the children’s phonemic awareness skills in both Study One and Two. This assessment tool was based upon and adapted from Carson, Gillon, and Boustead’s (2011) computer-based phonological awareness screening and monitoring assessment tool (see Chapter Four for more detail).

In Study One, two phonemic awareness skills were measured: initial phoneme identity and final phoneme identity skills. The junior infant children were assessed in the third week of September. The assessment was self-administered by the children and the results were sent to a database where scores were recorded and stored. Across the two tasks, there were 20 test items. One point was allocated to each test item with a correct response and incorrect answers were awarded zero.

In Study Two, the iPad-based phonemic awareness tool measured four phonemic awareness skills: initial phoneme identity, final phoneme identity, phoneme blending and phoneme segmentation. The junior infant children were assessed over three time intervals during their first year of school: September, January and June (see section 3.7.1.1 for more detail on the assessment phases of Study Two). During this round of assessments, the four phonemic awareness skills assessed in January were reassessed. These assessments were also self-administered by the children and results sent to a database, where scores were recorded and stored. Across the four tasks, there were 42 test items. Chapter Four of this dissertation explores, in detail, the creation of the iPad-based phonemic awareness assessment tool implemented in this research.

3.7.1.1 Assessment phases. During Study Two, the participating children's phonemic awareness skills were assessed at three points during their first year in school using an iPad-based phonemic awareness assessment app. The time schedule for these assessments can be seen in Figure 3.6.



Figure 3.6 Assessment phases in Study Two

The first round of assessments in September acted as a baseline for the study. During this assessment phase, two phonemic awareness tasks were assessed (initial phoneme identity and final phoneme identity), as the researcher felt that the phoneme blending and segmentation tasks would have been too challenging for junior infant children in their first month of school. This decision was made on the basis of research

findings which have demonstrated that these particular tasks are very difficult for young children to complete (Moats, 2003). This decision was further supported by Carson, Boustead, and Gillon's (2015) investigation into the validity of her computer-based assessment tool (Com-PASMA), where they found that the initial and final phoneme identity tasks were the most appropriate to assess at the beginning of the school year.

The assessment phase in January occurred directly after the completion of the implemented programme and consisted of four phonemic awareness skills: initial phoneme identity, final phoneme identity, phoneme blending and phoneme segmentation (at this stage, the children had received instruction in phoneme blending and segmentation). The third assessment phase, in June, was administered to ascertain whether the children's phonemic awareness skills had been maintained, had improved or had declined in the months subsequent to the implementation of the programme. It should be noted that, while the administration of the assessment in September took approximately 10 minutes, the assessments in January and June took approximately 20 minutes, as the children were assessed on four phonemic awareness skills on these occasions.

3.7.2 Qualitative Research instruments. As the teachers were integrally involved in co-constructing and evaluating the implemented phonological awareness programme, it was important to ensure the teachers' 'voices' was heard both during and after the implementation of the programme. Two qualitative research instruments were employed to achieve this: the use of documentary sources and a focus-group interview.

3.7.2.1 Teacher logs. The use of documentary sources refers to the analysis of documents that contain information about the phenomenon under investigation (Bailey 1994). Two documentary sources were utilized, collected and analysed for the purposes of this research: teacher logs and teachers' monthly progress reports. The advantages of using documentary sources are that they are unobtrusive, they provide a good source of background information, and they can highlight issues that are not noted by other means.

Each teacher involved in implementing the phonological awareness programme was asked to complete a weekly log of the phonological awareness skills and activities taught during each week. These logs were implemented to enable the teachers to reflect upon and evaluate the phonological awareness programme, while providing the researcher with feedback on the activities and resources included in the programme. In this log, the teachers documented the tasks that were completed (eg. initial phoneme identity) and outlined the activities they engaged the children in during that week. They were asked to reflect upon and comment on aspects of the instruction that went well or did not go well when implementing the activity (examples of completed logs can be found in Appendix B and B). The teachers discussed their input into these logs at their weekly planning meetings and, when issues arose, the teachers contacted the researcher to discuss possible amendments to the programme.

3.7.2.2 Monthly Progress Reports. Monthly progress reports are legal documents that individual teachers in Ireland must complete at the end of every month's teaching. These reports document what has been taught to the class during that month. At the end of each school year, the teachers' monthly progress reports (both control and experimental teachers), relating to the teaching of English, were collected by the researcher. These reports were collected for two reasons. Firstly, they allowed the researcher to establish the 'usual' English curriculum that was delivered to the control groups. Secondly, using these reports, the researcher was able to compare and contrast how much and/or when instruction in phonological awareness took place during the school year for both the control and the experimental groups. An example of a completed English monthly progress report can be found in Appendix C.

3.7.2.3 Focus-group interview. A focus-group interview is a group discussion on a particular topic organised for research purposes, with the discussion guided and recorded by a researcher. Focus groups are used for generating information on collective views, and

are useful in generating a rich understanding of participants' experiences and beliefs.

According to Morgan (1988), the advantage of holding a focus-group interview is that the reliance is on the interaction within and between the group who discuss a topic supplied by the researcher. It is from this interaction, that rich descriptive data emerges. In preparing the interview schedule for the focus-group interview, the researcher drew on Stewart and Shamdasani's (1990) two guiding principles:

1. Questions should move from general to more specific questions
2. Question order should reflect the importance of issues in the research agenda

The questions posed to participants during the focus-group interview can be found in Appendix D. During focus-group interviews, discussions often take on a life of their own, as the researcher probes and expands on issues as they arise during the discussion. However, it is important that the researcher can keep the discussion focused without leading it. Researchers conducting focus groups should guide a discussion rather than join in with it, as expressing one's own views may give participants cues as to what to say and this can introduce bias. Researchers must also be prepared that some views may be critical of aspects of the research that may be regarded as important to him/her.

The focus-group interview was conducted in a classroom within the school where the research took place. All four teachers involved in implementing the phonological awareness programme took part in the focus-group interview that lasted no longer than one hour. The interview was conducted at the end of the school year, after the last round of assessments had been completed. The objective of the focus-group interview was to determine 'how' or 'why' aspects of the phonological awareness programme worked, or did not work for those implementing it. This interview provided rich insights into how the programme supported the teaching and learning of phonological awareness skills and highlighted aspects of the programme that needed attention for future implementations. As

the teachers were important stakeholders in the research, it was crucial to listen to their views as, ultimately, they were the gatekeepers to the future sustainability of the programme. The focus group interview was audio recorded and, later, transcribed by the researcher.

The next section examines an emerging and evolving approach to educational research that embraces the need to address educational problems within real-world contexts and aims to reduce the existing, and much debated, research-practice divide. Referred to as educational design research, this methodological approach underpins the research that was conducted in this dissertation.

3.8 Research Design – Study One

The aim of this study was to address the first research question (see section 3.1) and, from an EDR perspective, to analyse and explore the identified educational problem, which related to junior infant children from lower socioeconomic backgrounds potentially beginning primary school with lower levels of phonemic awareness. Children from two schools were chosen to participate in the study – a DEIS urban Band 1 school and a non-DEIS school. Prior to conducting study one, the research instrument – the iPad-based phonemic awareness assessment tool – was piloted. The next section documents the two pilot studies that were undertaken.

3.8.1 Pilot Study. Two pilot studies were conducted prior to its administration in Study One. Eight junior infant children took part in the pilot studies. During the first iteration of the pilot, a number of programming issues arose. Firstly, it transpired that the children were able to cut the voice off, while instructions were being delivered, by touching any one of the images. This resulted in the children skipping to the next test item without listening carefully to what they were being asked to do. To combat this, a delay was built into the programme and the children had to wait until all the images were highlighted and all the instructions given before being able to select an image. Therefore,

even if they did touch one of the images while the instructions were being delivered, they did not skip onto the next test item.

Another issue that was rectified during the first iteration related to the presentation of the images on the touch screen. It was decided that instead of the images being shown all at once on the screen, each image would be illuminated as the word was being named by the voice. For example, in the final phoneme identity task the children are shown three images and asked to identify the image that ends with a target sound. In its initial iteration, all three images appeared on the screen from the outset; however, the researcher thought that this could be confusing for younger children, as the children are being asked to determine what each image is while trying to remember to listen for its final sound. Therefore, this was amended and the screen was initially blank. As the name of each image was said aloud, its corresponding image appeared on the screen one at a time.

Although it was important that the children were not informed whether they got an answer right or wrong (as the same assessment was implemented across three intervals), the researcher felt that some motivating phrases should be included as the children worked through the assessment. Therefore, motivational phrases such as ‘well done’ and ‘you’re doing a great job’ were randomly interspersed throughout the assessment.

It was also important that the storage of results on the online database was also tested. In order to do this, the researcher, the class teacher and the researcher’s assistant kept real-time, paper-based scores of the children’s responses during the pilot assessment. These scores were later checked against the scores recorded in the database. It was determined that the database was recording the children’s scores accurately.

During the second iteration, the identified and rectified issues worked as predicted; however, as two of the tasks were relatively long (the phoneme blending and phoneme segmentation tasks), the researcher felt that the children needed to be informed when they were nearing the end of each task to motivate them to complete the tasks. Therefore, a

command was included that informed the children that they only had two questions left on both the phoneme blending and phoneme segmentation tasks. This appeared to motivate the children as during the actual implementation of the assessment, a number of children shouted out that they only had two more questions to go. It was crucial to have conducted the pilot studies, as these issues were not anticipated in advance by the researcher and they would have resulted in significant problems had they arisen during the formal implementation in Study One.

3.8.2 School selection process. A stratification process was used to select and invite schools to take part in both Study One and Study Two. Twenty-three primary schools were situated within the chosen region. Firstly, all the senior schools in the area were discounted as the research needed to take place in a junior infant setting. Next, the schools were stratified into those designated as DEIS urban Band 1 schools and those not designated as DEIS schools. At this stage, DEIS Band 2 schools were also eliminated. Three schools were identified as DEIS Band 1 schools; however, two of these were not co-educational schools. The one remaining school was a large, urban, co-ed school with four junior infant classes. In order to draw comparisons between schools, and to reduce experimental error, the researcher needed to identify a similarly large, urban, co-ed school that served the same area. A non-DEIS school with five junior infant classes was identified. Once each school had been identified, emails were sent to the principals and meetings were organised to discuss the study further. Table 3.1 outlines the profiles of the two schools that took part in the research:

	School A	School B
SES Status	DEIS Band 1	Non-DEIS
School Population	425 children	1086 children
Number of Teachers	35	52

Pupil-Teacher ratio	1:20	1:29
Junior Infant Classes	Four	Five
School Structure	Junior School	Vertical School

Table 3.1 Profile of participating schools

It is important to note that, as can be seen from Table 3.1, class sizes differed in each school, as under the DEIS programme, DEIS Band 1 schools maintain a classroom ratio of 1:20 in junior infants, while in the non-DEIS school, the classroom ratio was 1:29.

3.8.3 Participants. In total, one-hundred-and-seven junior infant children from the two selected schools participated in Study One. For ethical considerations mentioned in section 3.10.4, participants from the DEIS school consisted of two cohorts from two separate year groups; ie., one group of junior infants were enrolled in the school in 2015/16 (DEIS15) while the other cohort were enrolled in junior infants in 2016/17 (DEIS16). The third cohort consisted of the children from the non-DEIS school (school year 2015/16). Table 3.2 illustrates the frequency distribution of the participating children in each cohort by gender and age.

	Cohort A DEIS15		Cohort B DEIS16		Cohort C Non-DEIS	
Number of children (n)	35		32		40	
Gender balance in each school	Male	Female	Male	Female	Male	Female
	22	13	19	13	20	20
Mean age	57 months		57 months		60 months	

Table 3.2 Frequency distribution of participating children

3.8.3.1 Inclusion criteria. Each participant needed to adhere to particular criteria for his/her data to be considered eligible for the study. The criteria included

- **the child being at least four years of age:** the age at which formal schooling commences in Ireland.
- **English being the child's first language:** as the study focuses primarily on the sounds of the English language, it was important that English was the child's native language.
- **children diagnosed with a speech and/or language/hearing impairment were not involved in the study:** often these children present with phonological deficits and, therefore, their inclusion may skew results.
- **written parental permission to participate in the study**

This information was gathered from the consent forms sent to parents and guardians. Parents and guardians were asked to document whether their child had any previous experience using iPads, whether English was the child's first language, and whether the child had ever been diagnosed with a speech and/or language condition.

It should be noted that although children were required to be native English speakers for the purposes of assessing the effectiveness of the phonological awareness programme of the study, the programme itself was delivered to *all* children in each experimental class. While not within the scope of this research, future research could examine the impact of such a programme on children whose first language is not English. Indeed, research would suggest that the phonological awareness skills already developed in the acquisition of a first language, including knowledge of the phonological system of the first language, should be transferred to the second language (Anderson, 2004).

3.8.4 Procedure. For the purposes of Study One, an iPad-based phonemic awareness assessment tool was utilised to assess the junior infant children's phonemic awareness skills. A quiet room within each school was sought for the administration of the

assessment. Prior to withdrawing the children, the room was set up with tables and chairs for eight children. An iPad and a set of headphones was laid out for each pupil. The children were withdrawn from their classes in groups of eight by the researcher. The researcher also had a garda-vetted colleague present while the assessments were conducted. After the initial instructions were read out by the researcher, the children were asked to put their headphones on and they self-administered the assessment. Each pupil completed the assessment in one sitting. The assessment took place during the third week of September and took approximately 10 minutes to administer. The researcher downloaded an e-book for children who finished the assessment early to read while the other children completed the assessment. Once the assessment was completed, the children were thanked and returned to their classroom.

3.8.5 Treatment integrity. The iPad-based phonemic awareness assessment tool was integral in ensuring treatment integrity in this study. As one voice was used to deliver the information on the app, each child in the study heard exactly the same voice during the assessment. This is an important consideration when assessing children's phonemic awareness skills, as a change in accent/dialect can have an impact on children's overall performance.

The findings from this study will be reported in Chapter Six.

3.9 Research Design – Study Two

The aim of this study was to address the second research question and determine whether the introduction of an explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, could improve the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school. The creation and construction of the programme relates directly to the second phase of EDR and this process is documented, in detail, in Chapter Five. A quasi-experimental, pre/post-test design was adopted to assess the effectiveness of the programme, while more quantitative measures

were utilized to determine ‘how’ and ‘why’ the programme worked, if indeed it did, for the teachers who implemented it.

3.9.1 Participants. This section outlines a profile of both the children and the teachers who participated in Study Two.

3.9.1.1 Pupil participants. The explicit and systematic, teacher-led phonological awareness programme was implemented in four junior infant classes in a DEIS urban Band 1 school. Of the 78 children engaged in the programme, 32 children (19 male and 13 female) met the inclusion criteria for assessment, as outlined in section 3.9.1.2. The low number of eligible children was due to the high proportion of children who were learning English as an additional language in the school. A further challenge was school attendance, as a number of children were not in school for all three assessment periods.

In total, 67 children were involved in Study Two: control group (n=35) and experimental group (n=32). Table 3.3 presents the profile of the children who participated in Study Two.

	Cohort A DEIS15 Control Group		Cohort B DEIS16 Experimental Group	
Number of children (n)	35		32	
Gender balance in each group	Male	Female	Male	Female
	22	13	19	13
Dropout rate	24%		29%	
Mean age	57 months		57 months	

Table 3.3 Profile of participants in Study Two

3.9.1.2 Inclusion criteria. Each participant in Study Two needed to adhere to particular criteria for his/her data to be considered eligible for the study. The criteria

included the same criteria as outlined in section 3.8.3.1, with the inclusion of one additional criteria for Study Two.

- **The child being present at school on all three assessment periods:** this criteria in particular was a strong contributor to the overall dropout rate as ensuring all of the children were present for each assessment interval was a challenge.

3.9.1.3 Teacher participants. The teachers who participated in Study Two were four junior infant teachers teaching in a DEIS urban Band 1 school. The teachers were asked by the principal of the school to nominate themselves to teach junior infants and, in so doing, volunteer to take part in the study. Therefore, the four teachers were eager to participate. All of the teachers were female. Table 3.4 profiles the teachers’ ages, teaching qualifications to date, and years spent teaching. All of the teachers had spent fewer than five years teaching junior infant classes. The teacher who were involved in implementing the phonological awareness programme are referred to as the expert-teacher group for the remainder of the dissertation.

	Teacher A	Teacher B	Teacher C	Teacher D
Gender	Female	Female	Female	Female
Age	25-29	25-29	30-35	30-35
Years experience teaching	6-10	0-5	6-10	6-10
Highest qualification	Postgraduate Diploma in Education	Bachelor of Education	Postgraduate Diploma in Education	Masters of Education (Early Childhood)

Table 3.4 Profile of teachers

3.9.2 Professional development for the expert-teacher group. Three levels of professional development were provided for the expert-teacher group. The first level consisted of 2 two-hour professional development sessions on phonological and phonemic

awareness (the Powerpoint presentations used in these professional development sessions can be found in Appendix E), which were delivered to the teachers by the researcher prior to the programme being implemented. The goal of these sessions was to increase expert-teachers' knowledge of phonemic awareness and to highlight its importance to later reading achievement. The first session incorporated theory and practice in the area of phonological and phonemic awareness, while the second session focused more on instruction and the delivery of the programme to be implemented as part of Study Two.

During one of these professional development sessions, the expert-teacher group considered the use of consistent language around the area of phonemic awareness to aid teacher discourse and to ensure consistency in each classroom. Language such as 'first/last', 'beginning/end', 'middle/medial' were important considerations for the teachers as they decided upon the terminology that would best suit their children.

The second level of professional development involved providing the expert-teachers with instructional guidelines for the phonological awareness programme. These guidelines outlined daily activities and included pre-made resources and examples of differentiation for activities. Each expert-teacher was given a pre-made pack for each task (for example, initial and final phoneme identification, phoneme blending and segmentation) containing all of the information and resources required to conduct the explicit and systematic lessons.

Finally, the third level of support consisted of the researcher providing ongoing support throughout the duration of the implementation of the programme. Using 'WhatsApp', the researcher and the expert-teachers set up a group and continued our discourse remotely. This proved to be a very effective way to communicate during the implementation. The expert-teachers discussed challenges as they arose amongst themselves and then contacted the researcher, who provided help and support when was

needed. The expert-teachers were also aware that the researcher could make herself available for face-to-face meetings should they be required.

3.9.3 Procedure. The following section outlines the manner in which the phonological awareness programme was delivered and implemented by the expert-teachers in their classrooms. The content that was covered, the time allocated to the programme and a brief outline of the structure of the lessons is also presented.

3.9.3.1 Delivery of the programme. The programme was implemented over 14 school weeks from early October to mid-January during the junior infant children’s first year in school. Three weeks of school holidays separated the programme implementation: one week at the end of October and two weeks in December. The breakdown of the content taught over the course of the 14 weeks is outlined in Table 3.5.

	Content Delivered
Week 1	Word Awareness
Week 2	Syllabification
Week 3	Onset and Rime
Week 4	Rhyme
Week 5	Initial Phoneme Identification
Week 6	Initial Phoneme Identification
Week 7	Final Phoneme Identification
Week 8	Final Phoneme Identification
Week 9	Phoneme Blending
Week 10	Phoneme Blending
Week 11	Phoneme Blending
Week 12	Phoneme Segmentation
Week 13	Phoneme Segmentation
Week 14	Phoneme Segmentation

Table 3.5 Content delivered over fourteen weeks of the programme

As can be seen from Table 3.5, only five of the fourteen weeks were spent teaching the broader phonological awareness skills. The remaining nine weeks were spent focusing on instruction of phonemic awareness skills.

The programme was delivered three times a week in each classroom using two different instructional groupings. The programme was implemented twice a week in small groups of five and once a week as a whole-class lesson. During the group sessions, three teachers (the expert-teacher and two resource teachers) and a special needs assistant worked in the room with small groups of children. This practice of team-teaching had already been established in the school prior to beginning the programme. The children were taught intensively in these groups for thirty-minute sessions twice a week. During this time, two teachers (the expert-teacher and a resource teacher) worked explicitly and systematically on a specific phonological awareness task. After this time, the groups rotated and another group of five children would receive instruction in the same task. As a result of this structure, each group of children received one hour of intensive, small-group instruction in phonological awareness per week. This was supplemented with thirty minutes, whole-class instruction per week for the duration of the programme. In addition to the instruction described above, the expert-teachers were also asked to informally reinforce the newly-acquired skills that had been taught during the week. The researcher gave the expert-teachers a range of phonological awareness activities that could be incorporated into other curricular subjects such as physical education. Songs, rhymes and other activities were also supplied that focused on an informal approach to the teaching of phonological awareness. Figure 3.7 outlines the time allocation for the delivery of instruction during the programme.

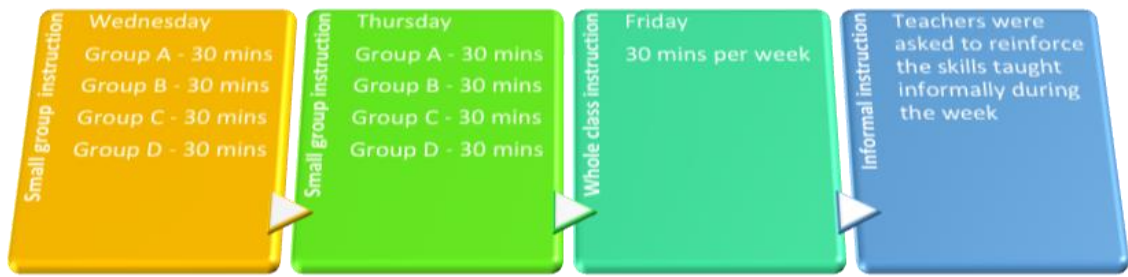


Figure 3.7 Time allocation for the delivery of instruction during the programme

The initial design of the intervention programme incorporated one week for each phonological awareness task, but, after implementing the first few tasks, the expert-teachers felt that the programme was moving too quickly for the children in their classes and, as a result, the timeframe of the programme was amended and, from the onset-rime task onwards, each task was taught over a two-week period. Based on their feedback, this timeframe was further expanded to three weeks for both the phoneme blending and phoneme segmentation tasks. This highlights the importance of EDR as a methodological approach when implementing programmes in classroom settings. The expertise and knowledge of the expert-teachers in conjunction with the content-specific knowledge of the researcher allowed for a responsive approach and ensured the programme could be adapted to meet the needs of both the children and the teachers delivering it.

3.9.3.2 Structure of the lessons. Cunningham (1990) recommends five steps to delivering instruction in phonological awareness. These five steps include:

1. Clearly informing the children of the objective of the lesson.
2. Revisiting the previous lesson and creating a clear connection between that lesson and the current lesson.
3. Modeling how to apply the skill and give examples.
4. Practicing the new skill under the guidance of the teacher.
5. Embedding the skill within the context of reading activities.

Based on Cunningham’s recommendations, Table 3.6 represents the structure of the small group and whole-class lessons:

Time allocation	Structure of Lessons
5 minutes	Review from previous lesson and outlining the objective of new lesson
20 minutes	Activities to support phonological awareness skill targeted for instruction that week modelled by the teacher and practiced by the children.
5 minutes	Shared reading with emphasis on phonological awareness skill targeted that week

Table 3.6 Structure of phonological awareness lessons

The structure of each lesson included an emphasis on the Gradual Release of Responsibility Model (Pearson & Gallagher, 1983). This model will be elaborated upon in more detail in Chapter Five, which explores the design and creation of the phonological awareness programme implemented in this research.

3.9.3.3 The ‘usual’ literacy curriculum. During Study Two, the teachers teaching the control group continued teaching the ‘usual’ literacy curriculum of the school. Generally, the ‘usual’ literacy curriculum in Ireland refers to a balanced approach to literacy instruction, with a strong emphasis on phonics instruction in the early years of primary school. A balanced approach to the teaching of literacy is advocated by the *Irish Primary School Curriculum* (NCCA, 1999). A research-based, balanced approach to literacy instruction is further supported by Kennedy et al. (2012) in their NCCA commissioned report *Literacy in Early Childhood and Primary Education (3-8 years)*. A

balanced approach to reading instruction combines positive aspects of whole-language instruction – where a strong emphasis is placed meaning-focused skills and on children being encouraged to read whole words and sentences in the context of real literacy experiences (Pressley, 2006) – with more code-focused phonics instruction. The phonics method refers to the teaching of letters/letter patterns and the sounds they represent.

However, despite the advocacy of a more balanced approach to the teaching of reading, research conducted by Concannon-Gibney and Murphy (2010) found that classroom instruction in junior primary classes in Ireland was both traditional and ‘unbalanced’ in nature. When analysing surveys completed by a sample of 400 primary teachers, they found that junior class teachers placed huge emphasis on words attack and phonic skills. The commercial programme, *Jolly Phonics*, features strongly in many Irish junior classrooms. The concern of the researcher of this dissertation regarding the use of this programme is that the teaching of synthetic phonics has become decontextualised from the process of reading itself with many teachers allocating specific, isolated time during the school day to the teaching of phonics. Alongside the strong emphasis on phonics, Concannon-Gibney and Murphy (2010) also found that there seemed to be ‘persistent use of oral sequential reading and a continued reliance on workbooks and commercial reading scheme. From their findings, Concannon-Gibney and Murphy (2010) voiced a concern regarding the ‘static nature of reading pedagogy in Irish classrooms and a failure on behalf of research, a revised curriculum, pre-service and in-career development to induce any ‘paradigm shift’ in reading instruction’ (p. 124).

A further feature of instruction in junior infant classes in Ireland is the introduction of station teaching. This form of teaching sees classroom teachers and resource/learning support teachers explicitly teaching literacy (and often numeracy) skills to small groups of children. The most common literacy stations in junior infants include guided reading (with the use of levelled texts), phonics, pre-writing/handwriting, oral language/vocabulary

stations. These stations move about every 15-20 minutes with most children being exposed to each station on a daily basis.

In general, the teaching of reading in the junior classes of Irish primary schools focuses on a 'bottom-up' approach to reading and, as such, places a strong emphasis on synthetic phonics and word attack skills. Concannon-Gibney and Murphy (2010) found that little attention is paid to instruction in reading comprehension skills in the junior classes as junior class teachers felt that such skills should be left and developed in more senior classes. This is despite current research which recommends that comprehension be taught from the outset of instruction (Pressley, 2002).

During both Study One and Study Two, the junior infant teachers (control and experimental group teachers) were asked to produce copies of their English monthly progress reports for the researcher. These documents enabled the researcher to determine the 'usual' literacy practices in each school. These documents supported the findings of Concannon-Gibney and Murphy (2010) and demonstrated a more traditional approach to the teaching of reading with a heavy emphasis on phonics instruction. Overall, the teachers of the control group were given very little information about the research being conducted to ensure that the topic under investigation did not impact on the content normally taught to the children.

Finally, it should be noted that while there is not a huge emphasis on the teaching of phonological awareness in the English primary school curriculum (NCCA, 1999), nor a great amount of detail in how to go about teaching it, the teaching of phonological awareness is included within the English curriculum (NCCA, 1999). Therefore, the researcher did expect that some degree of instruction in phonological awareness would be evident in the control group teachers' monthly progress reports. It should be noted that during the writing of this dissertation, a new *Primary Language Curriculum* was launched in 2016 from junior infants to second class; however, this curriculum had not been

implemented in schools during the lifetime of this research and did not impact upon the research. Thankfully, phonological and phonemic awareness feature much more prominently and explicitly in this new curriculum. Issues regarding the inclusion of phonological and phonemic awareness will be discussed later in Chapter 8, section 8.2.2.

3.9.3.4 Procedure for administration of iPad-based assessment tool. As with Study One, a quiet room was sought for the administration of the assessment. The same room was used on all three assessment phases. As Study Two required the same assessment to be administered on three occasions, the children were not informed as to whether they got an answer right or not. Instead, generic feedback such as ‘You’re doing a great job’ was built into the assessment tool to ensure the children got feedback on their work and to ensure they were motivated to complete the assessment. The procedure for conducting the assessment itself remained the same as Study One (see section 3.8.4). Each pupil completed the assessment in one sitting. The September assessment took approximately 10 minutes to administer as only two phonemic awareness tasks were assessed. The January and June assessment took approximately 20 minutes to complete as four phonemic awareness tasks were assessed. The researcher downloaded an e-book for children who finished the assessment early to read while the other children completed the assessment. Once the assessment was completed, the children were thanked by the researcher and returned to their classroom.

3.9.4 Treatment integrity. The primary goal of treatment integrity is to increase scientific confidence that changes in targeted outcomes are due to the programme under investigation (Peterson, Horner, & Wonderlich, 1982). In this study, it was important to ensure the integrity of the implemented programme was being maintained from classroom to classroom. However, it should be noted that, short of videoing classroom instruction, the absolute integrity of any implemented programme, especially across multiple classrooms and teachers, is challenging to ensure.

In an attempt to address the issue of treatment integrity, a number of procedures were put in place. Firstly, the expert-teachers were required to complete logs for each week of the programme as mentioned in section 3.7.2.1. The expert-teacher group met once a week to discuss their planning. During these meetings the teachers discussed the phonological awareness programme and any amendments that were required were discussed remotely (by email or through the WhatsApp group) with the researcher. The expert-teachers were also asked by the researcher to ensure that they delivered the same phonological awareness task at the same time to their classes, eg. in week three all of the expert-teachers taught onset-rime awareness to the children.

Secondly, classroom observations were conducted by the researcher in each classroom on two occasions during the implementation of the programme. The aim of the classroom observations were to gain insights into how the programme was being implemented and also to ensure it was being implemented with as much integrity as possible across classrooms and expert-teachers. As a non-participant observer, the researcher sat away from the group being taught and focused observations on the teachers and the small groups of children to see how the programme was being delivered and to examine the children's responses to the activities and resources. During both observation periods, the researcher used an observation checklist in order to apply a focused approach to the observations. The researcher used the following headings during the observations:

- Teacher instruction
- Pupil engagement
- Activities and resources
- Extending pupil learning

During these observations, the researcher noted some differences in how the teachers were implementing the programme. For example, some expert-teachers made more use of resources, such as the mirrors during instruction, than others. Some of the

expert-teachers also spent more time modelling new skills to the children than others. Any issues that arose during the observations were discussed with the expert-teacher group upon completion of the observation period.

3.10 Data Analysis

The following subsections outline the manner in which both the quantitative and qualitative data that was gathered in this research was analysed.

3.10.1 Quantitative data analysis. To analyse the quantitative data, a statistical software analysis package SPSS (Statistical Package for the Social Sciences, version 23) was used. The data from the iPad-based assessment tool database, Parse, was downloaded by the researcher and imported into SPSS. SPSS was then used to clean the imported data. A sample of the data from both the non-DEIS and the DEIS cohorts can be found in Appendix F. Statistical tests conducted on the data collected during the research included descriptive statistics, such as frequency counts, mean scores and standard deviation calculations. The mean response scores for each phonemic awareness task were calculated, and the standard deviation was used to check for any outlier scores in the data gathered. Hinton (2001) has advocated the use of a mean score where ‘if we take the mean as our central position, then we can compare each of the scores with the mean and find out how far each score varies or deviates from it’ (p. 13).

Independent samples *t*-tests were conducted to compare the mean scores between the control and experimental groups in order to identify whether there was a statistically significant difference in the mean scores for these groups. In addition to this, effect sizes were calculated to measure the degree to which the programme influenced the children’s increase in scores.

3.10.2 Qualitative data analysis. Thematic analysis was adopted to analyse the interview data, the data from the teacher logs, and the data resulting from the fieldnotes gathered during the classroom observations. The goal of thematic analysis is to identify themes and use these themes to address the research or to say something about an issue. According to Braun and Clark (2006), ‘thematic analysis can be a method that works both to reflect reality and to unpick or unravel the surface of reality’ (p. 81). While there are many different ways to approach thematic analysis, in the context of this research Braun and Clarke’s (2006) 6-Step framework was adopted. The six phases of thematic analysis, suggested by Braun and Clarke are

1. Organising, preparing and reading the data
2. Coding the data
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Writing up

Braun and Clarke (2006) also distinguish between a top-down thematic analysis, that is driven by the research question(s), and a bottom-up approach that is driven more by the data itself. As the current researcher’s analysis was driven by the research question, a top-down approach was adopted. The objective of the initial phase of data analysis was to become very familiar with the data by reading and re-reading the transcripts, teacher logs and fieldnotes. Any early impressions that were made were noted by the researcher at this stage. The next phase required the researcher to organise the data in a meaningful and systematic manner. Coding allowed the researcher to condense the transcribed data into categories that could then be further analysed using a thematic analytical approach. As this was a top-down thematic analysis, each segment of data relevant to the research question was coded. This work was conducted by hand through the use of highlighter pens. The

third phase required the researcher to search for themes within the data. A theme is considered a pattern that captures something significant about the data and/or the research question(s). As the data set in this research was very small, there was considerable overlap between the coding stage and identifying preliminary themes.

The next phase required the researcher to review, modify and develop the themes that were identified during the third phase. All of the data that was deemed relevant to the themes were cut out by hand and categorised under the relevant theme. The aim of the fifth phase is to 'identify the 'essence' of what each theme is about' (Braun & Clarke, 2006, p. 92). A number of the identified themes were considered 'a priori' themes and were identified in advance of reviewing the gathered data. As the phonological awareness programme was designed by the researcher for the purposes of this dissertation, certain assumptions were made that specific elements of the programme would be focused upon. These elements related to the ten design elements identified in Van den Akker's (2003) Curricular Spiderweb framework. This framework emphasises ten key design elements that need to be addressed when designing programmes and will be elaborated upon in more detail in Chapter Five, section 5.3. The benefit of identifying a priori themes means that the initial coding phase of the analysis can be sped up. However, there are a number of pitfalls associated with identifying a priori themes. In the first instance, by focusing attention on a priori themes, material that does not relate to them may be overlooked.

Secondly, the researcher may fail to recognise when an a priori theme does not prove to be the most effective way of characterising the data. In order to prevent such pitfalls, it is crucial for the researcher to recognise a priori themes as tentative and as subject to redefinition and/or removal as any other theme. In the context of this research, one general 'a priori' theme – programme structure and duration - was identified by the researcher and will be discussed in more detail in Chapter Six, section 6.3. Two emerging themes were also identified by the researcher from the data.

3.11 Ethical Considerations

The granting of ethical approval involved submitting a detailed application to the University of Dublin, Trinity College Ethics Committee. This application outlined a description of the study; the aims and scope of the study; the methods to be used; how informed consent was to be obtained; and how confidentiality and anonymity were to be maintained throughout the study. In any research study, ethics should be considered ‘an integral part of the research planning and implementation process, not viewed as an afterthought or a burden’ (Mertens, 2010, p. 12). When working with young children, ethical considerations are extremely important and need to occur at all stages as an ongoing and reflexive part of the research process.

3.11.1 Ethics and young children. The researcher was very aware, throughout the research process, that she was working with very young children and she was guided by the Department of Children and Youth Affairs (DCYA) (2012) *Guidance for Developing Ethical Research Projects Involving Children*. Built on a report by Felzmann, Sixsmith, O’Higgins, NiChonnachtaigh, and Nic Gabhainn (2010), and driven by the principles of the *United Nations Convention on the Rights of the Child* (UN, 1989), the DCYA document promotes best practice principles when conducting research in Ireland with young children. It draws attention to three core ethical considerations when conducting research. These are

- minimising risk of harm
- informed consent and assent
- confidentiality and anonymity

However, when conducting research with children, a number of additional issues need to be considered. These include

- child protection principles
- legal obligations and policy commitments in relation to children

- a child-centred, inclusive approach to research

The next sections will address five of these ethical considerations and how they were addressed in the context of this research. The ethical consideration relating to legal obligations will not be addressed in detail in this section, as such obligations were not relevant to this research other than to state that under the *UN Convention on the Rights of the Child* (UN, 1989), the research provided for the free expression of the children's own views.

3.11.1.1 Minimising risk of harm. A key ethical consideration in research involving children is the level of risk to which children may be exposed. For the purposes of this dissertation, the level of risk was considered 'minimal', as this level of risk implies that 'the anticipated probability and magnitude of harm or discomfort are not greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests' (DCYA, 2012, p.2). The children involved in this study were assessed within their own school building, in the presence of a Garda-vetted researcher and colleague. The duration of the assessment was also kept as short as possible to account for the developmental age of the children. Furthermore, the researcher arranged for the children to leave the classroom in groups of eight. This was done in order to make the children feel more secure as they were leaving the classroom as a group with other children they knew.

3.11.1.2 Informed consent and assent. After ethical approval was obtained for the research (see Appendix G), letters were written to the board of management and the principals of each school to request permission to conduct the study. Once this permission was granted, letters of information (see Appendix H) and consent forms (see Appendix I) regarding the study were distributed to the parents and guardians of the junior infant children in each school. Parents and guardians provided written permission for their child to be assessed as part of the study on the approved consent form. The expert-teacher group

were also asked to sign consent forms for data from their teacher logs and transcripts from a focus-group interview to be used as part of the research.

Although parental permission had been granted for the children participating in the research, the researcher was conscious that children ‘are not passive objects but rather competent and active agents’ (Skanfors, 2009, p.1). Indeed, Mertens (2010) reinforces this point by arguing that even though parents have legal authority to give permission for participation in research for their children, ethical research calls for assent to be given by the children themselves by explaining the study to them in child-friendly language. As the children involved in this research study were very young, upon meeting the children, the researcher introduced herself, and her colleague, and asked the children if they were happy to come to another room in the school to play some games on an iPad. Before leaving the classroom, each child was asked verbally whether they were happy to participate. As a former teacher, the researcher was well-versed in talking to young children in child-friendly language and she ensured she came down to the level of the children when talking to them. On one occasion, a child did make it clear to the researcher that they would rather stay in their own class. The pupil’s wishes were respected and he remained in the class and, in so doing, did not take part in the research. Researchers should also acknowledge that children’s consent should be seen as an ongoing process and as something that is renegotiated verbally at all stages of the research process. As children are less familiar with what research entails, they may initially wish to take part but later feel less keen to participate.

In her article, *Ethics in Child Research: Children’s agency and researchers’ ‘ethical radar’*, Skanfors (2009) draws researchers’ attention to the importance of having an ‘ethical radar’ when working with children. This ‘radar’ entails that the researcher remains aware of children’s actions and/or reactions towards the researcher and the research. Such actions can be non-verbal as well as verbal and require the researcher to be

attentive to the children for the entire duration of the research. On one occasion during the assessment period, it became obvious to the researcher that one child was not participating fully in the assessment and was becoming bored and disinterested. While the child was not verbally saying that he did not want to take part any longer, it was clear from his body language that he was becoming disengaged from the process. On this occasion, the researcher felt that it was better for the child to return to his classroom rather than be asked to perform further tasks. The child agreed and they were brought back to the classroom. Therefore, when engaging in research with young children it is important for researchers to activate their ‘ethical radar’, and to ensure that young children have a say in whether they want to partake in a research study or not.

3.11.1.3 Confidentiality and anonymity. The researcher highlighted in the parent and guardian information letter that their child’s details would be kept confidential at all times. The Data Protection Acts (1988, 2003) (Government of Ireland, 2003), cover a wide range of research-related activities relating to the collection, storage, access and disclosure of personal data. In accordance with the Data Protection Acts, only the minimum personal data required was sought and retained by the researcher. This data was not used for any other purpose other than that specified at the point of collection.

Appropriate security measures were taken to ensure the anonymity of the participants. Direct identifiers were removed from almost all documents and numerical codes were given to represent each child. Results from the children’s scores were downloaded from an online database, Parse, then the collection instrument was cleared and closed. This participant data was saved on an external drive for the duration of the research. The password-protected external drive was only accessible by the researcher, and passwords were changed every two months on a cyclical basis, to ensure the integrity and security of the stored data. All data will be destroyed 13 months after completion of the research study. This complies with current data protection legislation, which states that

personal data should only be held by the researcher for the study, and once the research is completed and published, the data should then be destroyed in a timely manner (Data Protection (Amendment) Act, 2003, Section 2D).

3.11.1.4 Child protection and well-being. All research in Ireland involving children is required to be conducted within the framework of *Children First: National Guidance for the Protection and Welfare of Children* (DCYA, 2017). This document recommends the Garda-vetting of researchers, and insists that all researchers have adequate skills and training in relation to child protection issues. As a teacher and lecturer in education, the researcher was well-versed in working within this framework.

3.11.1.5 Providing a child-centred, inclusive approach to research. When conducting research with young children, ethical issues can arise when investigating children in certain settings such as schools. One of these issues relates to the influence of power relationships. As the research in this dissertation took place in a school setting, the researcher was conscious that the children may have felt obliged to participate or not realise they had the right to refuse to take part. Upon meeting the children for the first time, the researcher informed the children that if they did not wish to take part in the research, at any stage, they could be brought back to his/her classroom and they would not be in any trouble for not taking part.

3.11.2 Ethical considerations when implementing quasi-experimental research in school settings. One further ethical decision to be made related to the implementation of the programme. Discussions were held with the stakeholders involved in the study – class teachers, principal of the school, PhD supervisor – regarding the quasi-experimental nature of the research. Obvious ethical issues were raised in relation to whether a programme designed to improve children’s phonemic awareness skills could be implemented with some children (experimental group) and not others (control group). The possible use of a phased-in approach was considered, whereby the children who do not

benefit from the treatment in the first year, receive it in the second year (if it has been proven to be effective). However, due to the nature of the programme implemented in this research, this approach was not deemed to be appropriate, as phonological awareness is most beneficial if introduced before formal reading begins.

Consequently, it was decided to conduct the study over a two-year period. In Year One, the DEIS junior infant cohort acted as the control group for the study and did not receive any specific instruction in phonemic awareness other than what they would have normally received as part of the 'usual' curriculum (see section 3.9.3.3). At this stage of the PhD process, the phonological awareness programme that was implemented in Year Two had not even been created. In Year Two, the new junior infant cohort from the same school acted as the experimental group and the entire year group received instruction in the explicit and systematic, teacher-led phonological awareness programme. As a result, there was a time gap of one year between assessing the control group and the experimental group.

To somewhat overcome the ethical issue of implementing quasi-experimental research in a school context, it was suggested and decided that as the expert-teachers' knowledge of the phonological awareness programme grew, and, if they considered it to be effective, they would share their knowledge of the programme with colleagues in learning support. The learning support teachers would then implement the programme on a one-to-one or with small groups of children who were exhibiting reading difficulties in senior infants. Therefore, while all of the children in the control group were not exposed to the phonological awareness programme, those who required additional support in their reading in senior infants did receive the same programme that was implemented with the experimental group.

3.12 Limitations of the Research

This section addresses a number of limitations that relate to the chosen research methodology.

3.12.1 Generalisability. Due to the context-bound nature of EDR, findings from neither Study One nor Two can be generalised to a larger population. As EDR strives to provide practical solutions to educational problems within specific contexts, the design principles that results from such studies should be viewed as ‘heuristic’ solutions: they provide guidance and direction, but do not give ‘certainties’. It is in this context that Reeves (2006) cites Lee Cronbach, one of the most influential researchers of the 20th century: “When we give proper weight to local conditions, any generalization is a working hypothesis, not a conclusion” (Cronbach, 1975, p.125).

3.12.2 Quasi-experimental design. In Study Two, the use of a quasi-experimental design meant that both the teachers and children were not randomly assigned to the experimental condition. However, the principals of both schools did indicate that there was an attempt made to make the classes as diverse as possible upon pupil enrolment by ensuring that there was, for example, a spread of children who had English as a additional language, a dispersal of children who came from the same early childhood setting, and even an attempt to ensure that there were not too many children in a class with the same name. Consequently, although the children were not randomly assigned to groups by the researcher, it could be argued that the classes were, in fact, partially randomised in each school due to the nature of the enrolment system of junior infant children in their first year of school. This limitation represented a trade off between enhancing the ecological validity of the study and protecting its internal validity by using a more controlled context within which to establish the effectiveness of the programme. As the natural setting for instruction in phonological awareness is within the classroom context, the researcher felt it was important to study such instruction in an authentic setting so as to examine the range

of possible variables that impact upon children's learning and teacher instruction within a classroom context.

Selection bias is also an acute problem in quasi-experimental studies in the field of education (Brown & Rodgers, 2002); however, the researcher of this current study would contend that due to the partially randomised nature of each class, and due to the mean age of the children and gender mix in each group being very similar, selection bias was diminished to some degree. Furthermore, as can be seen in Chapter Six, sections 6.2.1 and 6.2.2, the baseline scores for both groups on the initial and final phoneme identification tasks were also very similar.

Other potential threats to internal validity in quasi-experimental designs include history and maturation bias. History bias is a particular challenge to overcome when research occurs in real-life settings, as events other than the intervention programme may influence results; however, steps were taken by the researcher to protect the integrity of the research by ensuring classroom observations took place and teacher logs were completed over the course of the implementation of the programme. Maturation bias was also a potential limitation as the pre-intervention assessment and the follow-up assessment were conducted almost nine months apart. Consequently, any improvements in children's phonemic awareness skills could potentially be attributed to normal developmental processes over the course of the nine month gap.

While it is important to recognise the limitations of quasi-experimental designs, the researcher of the current study would argue that the advantages of conducting such research in authentic settings outweigh the limitations. The ability to conduct research in real-life settings ensures that intervention programmes are practical in nature, work for those implementing them within their own classrooms, and positively impact practice. In turn, this strengthens the external validity and, more specifically, the ecological validity of such studies. In an ecologically valid study, the methods, materials and setting of the study

approximate the real-life situation that is under investigation (Brewer, 2000).

Consequently, the external validity of a study is increased when conducted under real world conditions.

3.12.3 Adaptability. One of the most commonly faced methodological issues in EDR is the tension between making an intervention *work* in a complex setting, which necessitates a responsive approach to an intervention as it unfolds, with a researchers' need for empirical control, which argues against changing the planned treatment. Consequently, the responsive nature of EDR can potentially affect results. In the context of the current research, the phonological awareness programme evolved throughout its implementation, as the researcher, in collaboration with the class teachers, continually evaluated and redeveloped the programme to improve its implementation. This meant that the programme delivered in Week One looked somewhat different to the programme delivered in Week Fourteen. While this can be considered a limitation, the researcher of this dissertation would contend that the trade-off between expert-teachers implementing a prescriptive intervention designed by a researcher outside of a classroom setting outweighed the responsive, evolving nature of the implemented intervention programme, as the expert-teachers gained ownership over the programme and, consequently, there was a greater likelihood that they might continue to implement the programme into the future, because it was co-constructed by them to mirror their experience of teaching and learning within their own classrooms.

3.12.4 The researcher as designer and evaluator. Barab and Squire (2004) argue that 'if a researcher is intimately involved in the conceptualization, design, development, implementation, and re-searching of a pedagogical approach, then ensuring that researchers can make credible and trustworthy assertions is a challenge' (p. 10). Researcher bias is a familiar challenge in many forms of qualitative research; however, measures can be taken to improve this situation, such as making use of triangulation to

increase the quality of data and of analysis (Denscombe, 2007). However, the researcher of this dissertation would argue that as the intervention was teacher-led (and not led by the researcher herself), researcher bias was diminished to some degree. Furthermore, due to the collaborative nature of EDR, the phonological awareness programme was evaluated by both the researcher and the expert-teacher group on a continuous basis, with the teachers suggesting amendments to the programme that the researcher had not even considered such as only making use of CVC words in the delivery of the intervention. The researcher would argue that this collaborative evaluation process minimised researcher bias.

3.12.5 Classroom Context. A number of limitations were identified due to the real-world context of the research conducted. Firstly, the programme had to fit into the existing school timetable and curricular plans. This had implications for the duration of the programme. The researcher had hoped that the programme could be conducted in small groups four times per week for twenty minutes; however, as other aspects of literacy needed to be taught during these small group sessions, the programme had to be adapted to include two small-group sessions and a whole-class lesson per week. Furthermore, the teachers were very conscious of when instruction in phonics could begin and this led to some pressure to get the phonological awareness programme completed so that the teachers could begin work on the Jolly Phonics programme that was implemented throughout the school. The researcher would have liked the programme to have been extended further into the school year but as significant financial expenditure had been invested into the phonics programme, the school were anxious to ensure the teachers had enough time to implement it.

3.13 Chapter Summary

As an emerging research approach, with its roots in pragmatism, time was taken in this chapter to outline the origins, features and definitions of educational design research. The chapter also described, in detail, the two studies that were conducted to address the

research questions posed in this dissertation. The rationale for the implementation of mixed methods was discussed, as such an approach ensured the methods adopted were as responsive as possible to the complexity of the real-world setting of the research. This was followed by an description of how the qualitative and quantitative data was analysed. The chapter concluded with an exploration of the limitations of the methodological approach employed in this research. The next chapter will explore, in detail, the iPad-based phonemic awareness assessment tool that was designed and utilised by the researcher to assess children's phonemic awareness skills in both Study One and Study Two.

4.0 iPad-based Phonemic Awareness Assessment Tool

This chapter will examine, in detail, the assessment tool that was used to measure the children's phonemic awareness skills in Study One, and to determine the efficacy of the phonological awareness programme implemented in Study Two. Throughout this chapter a distinction is made between assessing children's phonological awareness and assessing their phonemic awareness. As presented in Chapter Two, section 2.2.2, phonological awareness is defined as 'attending to, thinking about, and intentionally manipulating the phonological aspects of spoken language, especially the internal phonological structure of words' (Scarborough & Brady, 2002, p. 312) and refers to a broad range of phonological skills from syllabification skills to phonemic awareness skills. Phonemic awareness skills are defined as the 'ability to blend or break up spoken words into component *individual* sounds' (Walsh, 2009, p. 215) and are considered the pinnacle of phonological awareness skills. It is important to make such a distinction as many assessment instruments target broader phonological awareness skills; few instruments are available that comprehensively assess children's phonemic awareness skills.

Regular monitoring and screening of children's phonological awareness is hugely important for the early identification of reading difficulties (Adams, 1990, Whitehead,

2004), and, as discussed in Chapter Two, section 2.7, there is a small window of opportunity within which phonological awareness can be used as a predictor of future reading ability. There are a range of assessment instruments available to teachers to assess children's phonological awareness (see Chapter Two, section 2.7) and the purpose of these instruments range from the monitoring and screening of phonological awareness development to the provision of diagnostic information on phonological deficits. However, despite the range of tools available for use in the classroom, the majority of these tools have considerable shortcomings. Firstly, although phonemic awareness is a significant predictor of future reading achievement (Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002), few existing assessment tools comprehensively assess children's development at the crucial phoneme level. Secondly, phonological awareness assessments can be very time-consuming to administer, as such tools are often paper-based and need to be administered on a one-to-one basis, which impinges upon valuable teaching time.

In light of the above, the research conducted in this dissertation sought to examine alternative, more time-efficient methods of assessing young children's phonemic awareness. As a result, an iPad-based phonemic awareness assessment app was created by the researcher in an attempt to overcome some of the shortcomings of more traditional assessment methods; in particular, the time-consuming nature of administering phonological awareness assessments.

As the range of tools currently available to assess children's phonological and phonemic awareness skills has already been discussed in Chapter Two, Section 2.7, this chapter will exam, in detail, the computer-based phonological awareness assessment tool developed by Carson et al. (2011), which was modified by the researcher for the purposes of this dissertation. A discussion on the validity and reliability of the computer-based assessment (CBA) tool will then be presented. The chapter will conclude with a detailed

exploration of the development of the iPad-based phonemic awareness assessment app and the limitations of using such tools.

4.1 Using tablets in the classroom

Tablet technologies, such as the iPad, have been increasingly adopted as learning tools and resources to engage and motivate children's learning. In fact, some researchers consider iPads to be 'game changers' (Brown-Martin, 2010) in teaching and learning, to the extent that the term "iPAdagogy" has been coined to refer to a range of teaching approaches that incorporate iPads into educational contexts (Cochrane, Narayan, & Oldfield, 2013). iPads have become such an integral part of children's lives today and are so ubiquitous that we forget that they arrived into schools only as recently as 2010.

In 2015, a five-year *Digital Strategy for Schools* (DES, 2015) was announced by the Minister for Education and Skills in Ireland. This strategy consisted of four key themes:

1. Teaching, learning and assessment using ICT
2. Teacher professional learning
3. Leadership, research and policy
4. ICT infrastructure

Funding to the tune of €210m has been made available to schools to improve their ICT infrastructure as part of the strategy, and, consequently, many Irish primary schools have access to broadband and are in possession of, at least, a class set of iPads.

The benefits associated with computer-based assessment tools also apply to the use of tablets; however, tablets have some additional advantages over the use of desktop computers and laptops. Unlike desktop computers, which can interrupt the learning process by necessitating physically moving children to a designated computer room, the mobility offered by handheld tablets has made Internet access readily available wherever learning takes place (Kim, Vaughn, Klingner, Woodruff, Reutebuch, & Kouzekanani,

2006). Also, unlike a laptop, the battery life of a tablet extends far beyond the usual school hours. Its short boot-up time and stability against crashes, make tablets a preferred learning device for use within schools. Furthermore, in comparison to desktop computers, minimal technical support is required when using iPads. Finally, a tablet's intuitive touch-interface presents an ease of use that is key to the successful adoption of such a learning device (Milrad & Spikol, 2007) as this touch-interface correlates with the technology in use in children's everyday lives (Ludwig & Mayrberger, 2012).

While the benefits of using tablets within educational settings are many, there are some disadvantages associated with the use of mobile devices that need to be addressed. As the number of tablets available in a school is often limited, the use of such devices requires significant planning and preparation on the teacher's behalf. Time for use needs to be allocated or timetabled and apps need to be downloaded in advance of their use in the classroom. Also, poor network access in school can lead to frustration when using mobile devices such as tablets. Sometimes areas in schools can present as network 'blind spots' and networks can also have difficulty coping with multiple devices working simultaneously.

As the implementation of tablets in educational settings is in its infancy, a scarcity of empirical research exists as to their effectiveness in supporting teaching and learning. Selwyn (2012) contends that 'the academic study of educational technology has grown to be dominated by an interest in the processes of how people can learn with digital technology [rather than] how digital technologies are actually being used ... in 'real- world' educational settings' (p. 66). One limitation that is becoming evident from the available research is teachers' capacity to use these devices effectively to promote teaching and learning. The recently published PISA-study *Students, Computers and Learning: Making the Connection* (OECD 2015), reveals that both teachers and children are still struggling to apply the technology for teaching and learning processes in schools. In their qualitative

study investigating the use of iPads to support literacy in early years schooling, Lynch and Redpath (2014) found that the impact of smart devices, such as iPads, depend largely on *how* they are used in classrooms. While iPads have the power and potential to transform learning, without sufficient teacher knowledge and professional development, their use can be limited to that of an interactive version of a worksheet or book. More worryingly, Lynch and Redpath (2014) state that ‘there is a real risk that the iPad and technologies like it will instead emerge as tools to be put to the service of already-established dominant classroom literacy practices, manifesting as mere content-delivery systems with some added interactive multi-media appeal’ (p. 172). Furthermore, Hutchison, Beschorner and Schmidt-Crawford (2012) warn that teachers need to consider whether a tool, such as the iPad, is being effectively used for curricular integration rather than merely for technological integration. In other words, does the use of the iPad enhance literacy instruction or is it being used by some teachers as a mere add-on to instruction? Therefore, while there is little doubt that mobile devices, such as the iPad, have huge potential to transform teaching and learning within classrooms, it is imperative that teachers understand how best to integrate these devices to promote genuine multimodal and multiliterate learning situations for children.

4.2 Computer-based Assessment (CBA)

In keeping with the educational design research (EDR) approach of this dissertation, it was important to find a practical solution to an educational problem. The researcher, therefore, designed a time-efficient phonemic awareness assessment app that could, in the future, be used by practising teachers in the natural setting of their own classrooms to assess children’s phonemic awareness in a time-efficient manner. Bearing in mind the shortcomings of paper-based assessments outlined in the introduction to this chapter, the researcher investigated the research literature further to examine whether other assessment tools existed that could be administered in a less time-consuming manner.

Consequently, computer-based assessments (CBAs) were identified by the researcher as a possible means of assessment that reduces the time teachers need to spend on administering and collating assessment results. CBAs are defined as ‘any psychological assessment that involves the use of digital technology to collect, process and report the results of that assessment’ (British Psychological Society, 1999, p.11). The four components of CBA are comprised of (1) assessment generation, (2) assessment delivery, (3) assessment scoring and interpretation, and (4) storage, retrieval and transmission (Singleton et al., 2001).

CBAs are becoming increasingly common in the field of education, and research indicates that such tools offer several advantages over paper-based equivalents (Martin, 2008). Firstly, the computer-based modality can present all test items at once; for example, verbal instructions and images. Secondly, they allow children to self-administer the assessment and respond via a computer mouse or a touch screen (Singleton, Horne, & Thomas, 1999). Thirdly, they can score and record the responses into a database for later interpretation by teachers (Bjornsson, 2008; Martin, 2008). These features place fewer demands on teacher time than traditional paper-based assessment tools. Additional benefits of CBAs include

- the standardisation of the test environment results in increased consistency and improved objectivity (Bjornsson, 2008)
- more accurate and immediate online scoring (Bridgeman, 2009)
- the fact that minimal training is required for teachers or other school staff in the administration of the assessment (Martin, 2008)
- it is motivating and engaging for children (Ripley, 2008)
- it makes use of technology already available in the classroom (Singleton et al., 1999)
- it is low-cost to implement once created (Tymms, 2001)

Despite the rise in the use of technology in the classroom, however, few CBAs exist to support teachers in measuring the phonological awareness skills of children, with even fewer supporting measurement at the critical level of the phoneme (Carson et al., 2011).

During an investigation of the research literature, a very limited range of phonological awareness CBAs were identified by the researcher. DIBELS (Good & Kaminski, 1996), while not exactly a CBA according to the British Psychological Society definition, is a web-based tool that *supports* the screening and monitors the progress of a range of early literacy skills (including initial sound fluency and phoneme segmentation fluency) using a data-management system. However, teachers are still required to administer the paper-based assessment and then enter the children's results into the DIBELS online system.

The Cognitive Profiling System (CoPs) (Singleton, Thomas, & Leedale, 1996) is an example of a computer-based assessment, which was established to identify children presenting with dyslexia. CoPS consists of nine game-like assessments that measure a broad range of skills from visual discrimination to auditory/verbal tests. Like DIBELS, it includes automated scoring and the storage of results; however, this assessment largely provides information on broader cognitive skills and, while CoPs does include an initial phoneme-matching task, other crucial phonemic awareness skills, such as phoneme blending and phoneme segmentation, are not included. Table 4.1 profiles a range of available phonological awareness assessment instruments and outlines the administration time, modality of delivery (paper-based or computer-based) and whether the content of the assessment includes assessment of broader phonological awareness skills or narrower phonemic awareness skills.

Instrument	Administration Time (minutes)		Modality		Content	
	Teacher	Child	Paper	Computer	Broad	Narrow
CTOPP**	30	30	+		+	
TOPA-2+**	30-45	30-45	+			+
PA Profile	10-20	10-20	+		+	
Yopp-Singer	5-10	5-10	+			+
PIPA	25-30	25-30	+		+	
PAT2	40	40	+		+	
DIBELS	9	9	+		+	
CoPS**		45-60		+	+	

Table 4.1 Administration time, modality and content of commonly-used phonological assessment

instruments available to classroom teachers

*Note. ** indicates that the assessment can be administered on an individual basis or to a small group of children.*

During the review of the research literature, the researcher of the current dissertation identified a CBA tool that is freely available to Australian teachers and is used to screen and monitor children's phonological awareness skills at the crucial phoneme level. This CBA tool is available as part of an ongoing research project entitled "Raising Reading Achievement in Australian Children: Predicting Literacy Pathways Using Web-Based Screening and Monitoring of Essential Pre-Reading Skills During the Early Childhood and Schooling Years" led by Dr Karyn Carson. The next section will examine Carson et al.'s (2011) Computer-based Phonological Awareness Screening and Monitoring Assessment (Com-PASMA) in detail. This tool is an integral part of this dissertation as it

formed the basis of the iPad-based phonemic awareness assessment app that was designed and implemented by the researcher to assess children's phonemic awareness skills in both Study One and Study Two.

4.2.1 Limitations of Computer-based Assessment. Although considerable benefits exist when using CBA tools, they are not without their limitations. One key limitation is technology failure. There is always the possibility that glitches can be experienced when trying to administer a CBA (Tymms, 2001). However, implementing pilot studies can minimise such glitches. Glitches that were identified in the pilot study were discussed in Chapter 3.

Furthermore, the reliability of broadband within schools is a serious consideration when administering a CBA tool such as an app. In an Irish context, access to broadband in schools is constantly improving and the Irish government has invested significantly in this area in recent years. Consequently, the researcher did not experience any issues in relation to the use of the Internet while using the iPads; however, this may not be the case in other schools throughout the country.

A further limitation that requires consideration is the fact that the creation of an app, such as the one implemented in this study, can be costly. However, once an initial investment has been made, there is very little cost associated with its future implementation. There are other limitations to consider in relation to administering a computer-based assessment. It is important to recognise that some children may have insufficient technology skills, and this could pose a problem when they are required to complete an assessment on a tablet device or computer. Therefore, the introduction of the familiarisation task on the iPad-based app was important to ensure that children who had not been exposed to iPads or tablets in the past had an opportunity (outside of the formal assessment) to familiarise themselves with the technology. To try to establish whether children were familiar with using such devices, the researcher asked parents to indicate on

the consent form whether their child had used a tablet device or smart phone before. Of the one hundred and seven junior infant children who participated in this research, only 2% of the children had never used such a device according to their parents. With the rise in the use of technology, over time, lack of exposure to technology will, more than likely, become less of a limitation.

4.3 Carson, Gillon, and Boustead's (2011) Computer-based Phonological Awareness Screening and Monitoring Assessment (Com-PASMA)

The computer-based phonological awareness screening and monitoring assessment (Com-PASMA), identified in the review of the research literature, was created by certified speech and language pathologist Dr Karyn Carson (2011), alongside her colleagues Gillon and Boustead. Carson recognised the need for a more time-efficient method of assessing children's phonological awareness. In her work, Carson, alongside colleagues Gillon and Boustead, established a computer-based assessment tool that focused on assessing phonological awareness in a time-efficient, user-friendly manner. Carson et al.'s (2011) Com-PASMA departs from other computer-based assessments in that it focuses on assessing phonological awareness at the phoneme level and pays particular attention to the important phoneme blending and phoneme segmentation skills. Another significant feature of this computer-based assessment (CBA) is that it allows the children to self-administer the assessment, while, at the same time, records and stores the children's results in an online database. This allows for multiple children to be assessed in one sitting; however, this is dependent on the number of computers available for assessment purposes.

Carson et al.'s (2011) Com-PASMA was presented to children via a desk-top computer and consisted of six phonological awareness tasks (rhyme oddity, initial phoneme identity, final phoneme identity, phoneme blending, phoneme segmentation, and phoneme deletion) and two letter-knowledge tasks (letter name and letter sound knowledge). All but one (rhyme oddity task) of the phonological awareness tasks are

directed at the phonemic awareness level. Each task is presented in a game-like format to motivate and engage the children. Children are guided through each task using voice recordings, and they are required to respond to each test item by clicking a mouse.

From the perspective of the current researcher, the advantages of the time-efficient implementation of Com-PASMA, together with its focus at the crucial level of the phoneme, made Carson et al.'s CBA an appropriate tool to examine in more detail and adapt for the purpose of this dissertation. However, in order to ensure the robustness of Com-PASMA, a number of prerequisites were important to establish. Firstly, it was important to ensure that administering an assessment by computer, instead of by more traditional means, such as paper-based administration, would not affect the results. Secondly, the validity of Com-PASMA needed to be established and, thirdly, the reliability of the CBA needed to be examined. These three issues are discussed in the following sections.

4.4 Validity and Reliability of Com-PASMA

According to Guernsey, Levine, Chiong, and Severns (2012), the technology boom has resulted in a plethora of easy-to-download, literacy-based applications that claim to support reading development with little or no evidence of validity, reliability, efficacy or effectiveness to support these claims. Therefore, this section provides evidence of the validity and reliability of Com-PASMA. The provision of such evidence ensures that this assessment tool can be employed with confidence by the researcher of this dissertation to assess young children's phonemic awareness.

To establish both the validity and the reliability of Com-PASMA, Carson et al., (2015) took a sample of ninety-five participants (thirty-nine boys and fifty-six girls) who were in their first year of formal schooling. The participants received the 'usual' New Zealand literacy curriculum and were assessed at three points during their first year of school: at the beginning, middle and end of year. The results of Carson et al.'s (2015)

research, in relation to the validity and reliability of Com-PASMA, will be discussed in sections 4.4.1 and 4.4.2.

4.4.1 Validity of Com-PASMA. Validity refers to the extent to which an instrument measures that which it intends to measure (Messick, 1995). In their study, Carson et al. (2015) examined the content validity, construct validity and criterion validity of Com-PASMA. Content validity refers to the systematic evaluation of the content within a test to ensure it accurately assesses the construct being measured (Anastasi & Urbina, 1997), while construct validity ensures that the test measures the construct it intends to measure (in this instance, phonological awareness) (Thorndike & Thorndike-Christ, 2010). Criterion validity refers to whether or not the assessment produces similar results to existing phonological awareness tools already considered to be valid and reliable. These were vital to establish in order to consider employing the Com-PASMA as a means of assessing children's phonemic awareness in Study One and Study Two of this dissertation.

4.4.1.1 Content validity. Content validity refers to the process of systematically ensuring that test content accurately reflects the knowledge being measured (Anastasi & Urbina, 1997). For example, does the assessment tool include phonemic awareness tasks and test items that, according to the research literature, are appropriate for young children in their first year of formal schooling? Using the Rasch Model (Bond & Fox, 2007) to analyse the responses of ninety-five participants, Carson et al. (2015) compared patterns of responses to determine whether items showed a 'fit' or 'misfit' to the ability of the test takers. From their analysis, Carson et al. confirmed that the majority of test items were a suitable 'fit' for the intended population and that test items also sampled a spectrum of difficulty levels to enable differentiation between high- and low-ability children. Carson et al.'s analysis found that the initial phoneme identity task was appropriate to administer at school-entry as no misfits were identified for this task.

A number of test items did deviate from the ideal range and were identified as ‘misfits’. Table 4.2 highlights the misfits identified in Carson et al.’s (2015) study.

	Start of Year	Mid-Year	End of Year
Initial Phoneme			
Final Phoneme	Items 2, 3		
Phoneme Blending		Item 5	
Phoneme Segmentation	Items 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18	Items 16, 17, 18	Items 16, 17, 18

Table 4.2 Misfits identified by Carson et al. (2015) for four phonemic awareness tasks

As can be seen from Table 4.2, more challenging phoneme tasks, such as phoneme segmentation in particular, were very challenging for children to complete at school-entry; however, they did become increasingly appropriate and could differentiate between high- and low-ability children towards the middle and end of the first year of school. Carson et al.’s (2015) results indicated that tasks, such as phoneme segmentation, were generally more difficult and less reliable at school-entry. In fact, items 4 to 18 at the start of the year in the phoneme segmentation task could not be analysed using the Rasch Model, as the majority of the responses were incorrect. Carson et al. concluded that fewer than ten per cent of the children provided a correct response to phoneme segmentation items 4 to 18. This indicated that these items were extremely difficult for children to complete at the start of their first year in formal schooling. These results supported the researcher’s decision not to assess the children in the phoneme blending and phoneme segmentation tasks as part of the initial round of assessments in September. This decision was further supported by the literature, which advises that phoneme segmentation, in particular, is considered a very challenging phonemic awareness task for 5-year-old children (Adams, 1990; Chard &

Dickson, 1999; Moats, 2003). However, by the middle and end of the school year, fourteen out of eighteen phoneme segmentation items demonstrated a ‘fit’. This indicated that this task became a more appropriate measure as the children moved through their first year of school.

The misfits identified by Carson et al. (2015) required close attention by the researcher when adapting Com-PASMA for the purposes of the research conducted in this dissertation. However, it is important to note that items presenting with a misfit may not require adaption or deletion as their low level of difficulty is often a purposeful part of the test construction process to ensure graded levels of difficulty within tasks. Two tasks, the final phoneme identity and the phoneme blending task, demonstrated a misfit at only one or two points in the school year. These were not considered to require adaption or deletion as a result. However, three items within the phoneme segmentation task, items 16, 17 and 18, demonstrated a significant misfit as they appeared at all three assessment points in the school year. This could be due, in part, to the fact that all three of these items required the children to segment words that included final blends (eg ‘st’ in ‘cast’) and final digraphs (eg. ‘nd’ in ‘pond’) in words. However, Carson et al. (2015) argued for the continued inclusion of these items as their retention allows teachers to identify high performing children. Also, difficult items are beneficial in reducing ceiling effects, which is an important consideration when developing tests. Consequently, none of the misfits were altered or deleted for the purposes of the research conducted in this dissertation. From Carson et al.’s (2015) thorough analysis of the content validity of Com-PASMA, the researcher determined that this CBA could be used with confidence to measure the phonemic awareness abilities of children during their first year of formal schooling.

4.4.1.2 Construct validity. Construct validity refers to the degree to which Com-PASMA adequately measured the construct of phonemic awareness. As mentioned in Chapter Two, section 2.5.5, phonemic awareness is considered to follow a sequential

development in relation to task complexity (Ehri et al., 2001). Tasks such as identifying phonemes are considered easier to complete than tasks requiring children to manipulate phonemes. Therefore, the construct validity of Com-PASMA should support the developmental nature of phonemic awareness and represent a continuum of difficulty over the first year of formal schooling. In order to evaluate whether Com-PASMA represented the construct of phonemic awareness, Carson et al. examined three sources of validity: factor analysis, test characteristic curves and effect-size analysis. From their research, Carson et al. (2015) found that exploratory factor analysis demonstrated that all of the phonemic awareness tasks provided a measure of the same underlying trait: phonemic awareness. Furthermore, computation of test characteristic curves showed a graded level of difficulty between each task. The initial phoneme identity task appeared to be the easiest task to complete, followed by the final phoneme identity task, phoneme blending and, finally, phoneme segmentation. Effect sizes between performances from the start to middle, and from the middle to the end, of the school year were also large. These results indicate that Com-PASMA is sensitive to growth and development in phonemic awareness over the school year and provides evidence of strong construct validity.

4.4.1.3 Criterion validity. For the purposes of establishing the criterion validity of Com-PASMA, the *Preschool and Primary Inventory of Phonological Awareness (PIPA)* (Dodd et al., 2000) was chosen by Carson et al. (2015) to obtain a standardised profile of phonological awareness ability. The PIPA is an existing, paper-based test that provides normative data for Australian and British children. In particular, the phoneme isolation measure was examined as this test is common to both the PIPA and Com-PASMA. When results from both tests were analysed, Carson et al. identified significant positive correlations on the initial phoneme identity task ($r=0.88$, $p<.001$) between the PIPA and Com-PASMA. This further establishes Com-PASMA as a valid tool for measuring children's phonemic awareness.

4.4.2 Reliability of Com-PASMA. Reliability refers to how consistent an assessment is over repeated administrations. Determining the reliability of Com-PASMA was essential for the researcher of this dissertation as it provided confidence that test scores would be comparable over repeated administrations. In the case of the CBA tool, both the internal consistency of the test and its test-retest reliability were examined. This section details the reliability of Carson et al.'s (2015) Com-PASMA.

4.4.2.1 Internal consistency. Internal consistency examines the degree of correlation between the items within a test and the consistency of responses between items (Thorndike & Thorndike-Christ, 2010); for example, ensuring that the items within the test are correlated and measuring the same trait (that all test items within the initial phoneme identity test are measuring initial phoneme identity). Evidence of internal consistency indicates that the items in the test measure one construct. Using Cronbach's alpha, Carson et al. (2015) calculated the internal consistency between items within each phonemic awareness task at the start, middle and end of the first year of formal schooling. Cronbach's alpha scores above 0.7 indicate that the items within a task are internally consistent (Field, 2009). Table 4.3 outlines the Cronbach's alpha scores for each of Carson et al.'s tasks during the school year.

Task	Start of Year	Middle of Year	End of Year
Initial phoneme identity	.89	.85	.85
Final phoneme identity	.14	.84	.89
Phoneme blending	.45	.94	.92
Phoneme segmentation	.47	.89	.89

Table 4.3 Cronbach's alpha scores by task at the start, middle and end of the school year of Carson et al.'s (2013) Com-PASMA

Table 4.3 highlights that, at the start of the year, initial phoneme identity demonstrated a high degree of internal consistency. Unsatisfactory Cronbach's alpha scores were calculated for the final phoneme identity, phoneme blending and phoneme segmentation tasks at the start of the year. Carson et al. found that these results were consistent with the Rasch analysis findings and indicated that these tasks were less reliable at the start of the school year. However, by the middle and end of the year, high Cronbach's alpha scores were in evidence for all phonemic awareness tasks. These results demonstrate that Com-PASMA becomes increasingly reliable in measuring children's phonemic awareness as children move through their first year of school.

4.4.2.2 Test-retest reliability. It was also essential for the researcher to ensure the consistency of Com-PASMA across repeated administrations. To establish this, Carson et al. correlated each task with itself at each of the three assessment points during the school year. Carson et al. reported significant correlations at $p < .01$ for each task. After researching Carson et al.'s (2015) examination of both the validity and reliability of Com-PASMA, the researcher was confident that the CBA tool could be administered consistently over repeated administrations to appropriately assess children's phonemic awareness over the course of their first year of formal schooling.

The next section examines the limitations of using computer-based assessment tools and highlights issues such as availability of adequate technology to support its use, as well as the cost of implementing such tools.

4.5 Adaption of Carson et al.'s (2011) Com-PASMA

For a number of reasons, it was not possible to use Carson et al.'s (2011) CBA tool directly, in its existing form, in an Irish context. First and foremost, Com-PASMA is an assessment tool that was designed for use with children from Australia and New Zealand and, therefore, it features an Australasian accent throughout. As children are being asked to focus solely on the sounds of language when assessing phonemic awareness, it is of

paramount importance that children hear an accent that is familiar to them (in the context of this research, an Irish accent), as phonemes can have different sounds depending on how they are pronounced in different countries. For example, the vowel sounds in New Zealand English are pronounced in a different manner to the vowel sounds spoken in Irish English. For example, if one of the test items asked children to identify the vowel sound in the word 'pen', this could cause confusion as New Zealand English tends to raise the 'e' vowel and, consequently, the word 'pen' sounds like 'pin'. Similar issues surround the 'a' vowel also as words like 'trap' tend to sound like 'trep' when said with a New Zealand accent. R-controlled vowels and consonants such as a 't' can also be problematic.

Therefore, permission was sought from Dr. Carson to amend the existing CBA to incorporate an Irish accent (graciously, she granted permission for changes to be made for the purposes of this dissertation). However, the complexity of creating new voice recordings and importing them into the existing computer programme proved highly prohibitive from a cost perspective. As a result, the researcher considered other possible options and, eventually, considered adapting and modifying the existing assessment tool, so that the assessment could be conducted via an app on an iPad.

Once again, permission was sought from Dr. Carson and she was happy for the researcher to create an app version of the existing CBA tool in order for children to complete the CBA on an iPad. The next section will examine the effectiveness of using iPads in the classroom. This will be followed by a detailed description of the phonemic awareness app that was created by the researcher with the help of a software engineer.

4.6 System Design

A general description of the technological system as specified by the researcher and implemented by a software engineer, will be provided in this section and the elements that constitute the system design of the assessment tool will be identified. As the assessment was conducted using iPads, an app of the phonemic awareness assessment was created by a

software engineer. Figure 4.1 shows a diagram of the elements of the system design used in the creation of the iPad-based phonemic awareness assessment app. This diagram provides a general overview of the architecture used in designing the app. It consists of three main elements: interface, logic layer and database layer. Each element is described briefly below.



Figure 4.1 System design diagram

The *interface* is what the child interacts with. In the case of the phonemic awareness assessment app, the interaction took place using the iPad's multi-touch screen, which displayed the phonemic awareness tasks (output) and recorded touches as the child responded to the tasks (input). The interface is connected to the next element, the logic layer, which is responsible for sending the code to be used and touch recognition. Once a touch is recognised and a score assigned, it is then sent to the interface from the logic layer.

The *logic layer* is responsible for the functioning of the assessment tool. It is connected to the interface (sending the information to be displayed on the screen and recognising the touch events performed while the tool is being used) and the database layer (sending the tool's parameters – child's name, age, identification number, gender, score – to be stored in the database layer).

The *database layer* manages all the processes for storing the results obtained when a child responds to a test item. It is connected to the logic layer and initiates the processes

involved in the retrieval of data. Results are then displayed in the form of a table to the researcher and are accessible from any device with Internet connection.

For this study, the researcher set the specifications of the graphic user interface, which included ensuring that colourful, child-friendly images were used for each task item. This was an essential consideration, as it was vital that the children recognised the images on sight and did not find them confusing in any way. For example, one test item required an image of ‘lips’ to be displayed for the children. If the researcher had included an image of a face with eyes, nose and lips, the children might have considered the word to be ‘face’ instead of ‘lips’. Therefore, a high degree of attention was given to selecting the images to be included in each task in order to reduce any confusion.

Recordings of verbal instructions were also provided by the researcher with the researcher’s Irish voice featuring for each task and test item. For the most part, the researcher maintained the same simple sentence structure and instructions as provided in Com-PASMA (Carson et al., 2011), which were in line with those used by Bradley & Bryant (1983), Gillon (2005) and Stahl & Murray (1994). Following the verbal instructions, the name of each multiple-choice response option was vocalised while the corresponding image was presented to the children. This was to ensure that the children did not misinterpret what the image represented. The provision of the pre-recorded voice allowed for the standardisation of the assessment, and each child heard the same voice across all three assessment periods.

4.7 Selection of Phonemic Awareness Tasks and Test Items

The iPad-based phonemic awareness assessment app consisted of a familiarisation task and four phonemic awareness tasks – an initial phoneme identity task, a final phoneme identity task, a phoneme blending task and a phoneme segmentation task – adapted from Carson et al.’s (2011) Com-PASMA. It should be noted that as Carson’s existing CBA made use of simple CVC, CCVC and CVCC words such as ‘hen’, ‘flag’ and ‘nest’, there

was no need to adapt the words used for any of the test items, as the words used by Carson were considered to be recognisable to Irish children. Carson's words were drawn from *The living word vocabulary: A national vocabulary inventory* (Dale & O'Rourke, 1981). This word list contains more than 43,000 items, each identified by simple word meaning. For each item, the list provides a grade level and a percentage score, which indicates the percentage of children at that grade level that should understand the word.

During the course of self-administering the assessment, the children were not made aware of whether their answers were right or wrong to ensure that the same assessment tool could be used to reassess the children at two more stages later in the school year. However, after administering the app during the pilot study, the researcher felt that some non-specific feedback, such as 'you're doing a great job' and 'well done', should be embedded randomly throughout the assessment tasks in order to keep the children motivated. Each task was presented in a game-like format, which is reported to be engaging, motivating and non-threatening for children (Beech & Singleton, 1997). The following section provides a brief rationale for the selection of the phonemic awareness tasks included in the assessment.

4.7.1 Selection of phonemic awareness tasks. Carson et al.'s (2011) selection of phonemic awareness tasks for Com-PASMA was based on knowledge of how phonemic awareness develops and, in particular, on the cognitive operations (or task complexity) required to perform a phonemic awareness skill. For example, as discussed in Chapter Two, section 2.2.5, the research literature demonstrates that identifying the initial phonemes in spoken words is an easier task for children to perform than phoneme blending or segmentation. Therefore, identifying phonemes was introduced as the first task for children to complete. This task was subdivided into the identification of initial phonemes, followed by identification of final phonemes, to take cognisance of the fact that the

position of the phoneme is shown to affect the difficulty levels of a phonemic awareness task (see Chapter Two, section 2.2.6.5).

The ability to manipulate phonemes (for example, the addition and deletion of phonemes) was not included in the assessment, because it is considered too difficult a task for children of this age level to complete (Moats, 2003). As a result, the four phonemic awareness tasks included in the iPad-based phonemic awareness assessment app were initial phoneme identity, final phoneme identity, phoneme blending, and phoneme segmentation.

4.7.2 Selection of test items. Once the phonemic awareness tasks were selected, the construction of test items within each task was addressed. Carson et al. (2011) conducted a review of the available literature ‘to identify criterion-referenced probes commonly used to measure progress in response to phonemic awareness instruction’ (p. 76). Accordingly, the initial phoneme identity task was modelled on paper-based probes developed by Bradley and Bryant (1983), and later modified by Gillon (2005). For the final phoneme identity, phoneme blending and phoneme segmentation tasks, probes developed by Stahl and Murray (1994) were used in the construction of these test items. It should be noted that the original Stahl and Murray (1994) probes required children to produce a verbal response, whereas the use of the iPad required children to produce a more receptive response by directly manipulating the touch screen.

In order to alter the difficulty level between each test item, syllable structures and manners of articulation were manipulated. Syllable structure can be manipulated by increasing the number and sequence of consonants (C) and vowels (V) in a given word. While all of the words used in the assessment were monosyllabic, test item difficulty was introduced by initially introducing simple CV (for example, tie) and CVC (for example, ‘pig’) words. Difficulty was increased by introducing more complex syllable structures such as four-phoneme words with initial or final blends; for example, CCVC words such as

‘plate’ or CVCC words such as ‘nest’. The initial phoneme identity task comprised of CV, CVC, CVCC, and CCVC words, while the final phoneme identity, phoneme blending and phoneme segmentation tasks consisted of CVC, CCVC and CVCC words.

As a certified speech and language pathologist, Carson considered the manner of articulation when selecting words for test items. ‘Manner of articulation’ refers to how the articulators (for example, tongue, lips, soft palate, teeth) involved in speech production produce a particular sound (Bernthal, Bankson, & Flipsen, 2009). Commonly, there are five manners of articulation in English: stops, fricatives, affricates, nasals and approximants. The manner of articulation has been shown to affect the difficulty of test items and, in doing so, can discriminate between high- and low-ability children. For example, in phoneme-level tasks, continuant sounds (for example, /s/, /f/, /v/) are easier to identify than stop sounds (for example, /k/, /g/, /t/, /d/).

Table 4.4 outlines the linguistic complexity of test items in each task as profiled by Carson et al.(2011) and highlights the variety of syllable structures and manners of articulation that were included to achieve differentiation between test items.

Task	Number of items	Syllable Structure	Manner of Articulation				
			Stops	Fricatives	Affricates	Nasals	Approximants
Initial Phoneme	10	CV, VC, CVC, CVCC	33	10	0	0	0
Final Phoneme	10	CVC, CCVC, CVCC	28	17	0	11	13
Phoneme Blending	14	CVC, CCVC, CVCC	56	20	0	22	19
Phoneme Segmentation	18	CV, CVC, CCVC, CCV, CVCC	22	9	1	5	4

Table 4.4 Outline of the syllable structures and manners of articulation present in each phonemic awareness task of Carson et al.'s CBA

The following section outlines the phonemic awareness tasks as they were presented to the participants on the iPad-based assessment app.

4.7.2.1 Task item menu. The initial screen of the app presented a menu of the tasks to be completed during the assessment. After each task was completed, the screen reverted back to this initial menu and the next task was enabled. This was one significant feature included after piloting the iPad-based assessment. Consequently, the children could only access the subsequent task when the previous task was fully completed. This was an important feature, as the tasks followed the developmental nature of phonemic awareness. A screenshot of the Task Item Menu that was presented to the children can be seen in Figure 4.2.

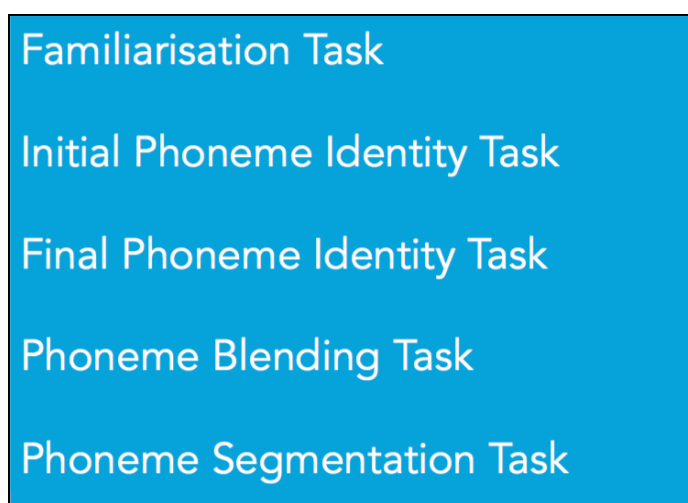


Figure 4.2 Task Item Menu

4.7.2.2 Familiarisation Task. At the beginning of each assessment interval, every children had to complete the familiarisation task before continuing with the assessment. When first presented with the task menu, the familiarisation task was the only task that was enabled. As a result, the children could not access any other task until they had successfully completed the familiarisation task. It was important to incorporate a task at the outset of the assessment that allowed the participants to practise operating an iPad touch screen, especially if they had never operated such a device before. Only one child in the entire cohort did not pass the familiarisation task. As a result, this child's scores were not included in the data analysis. This task required the children to look at three pictures

(see Figure 4.3) and touch the picture instructed by the voice. The familiarisation task consisted of one exemplar followed by five items that the participants were required to complete.

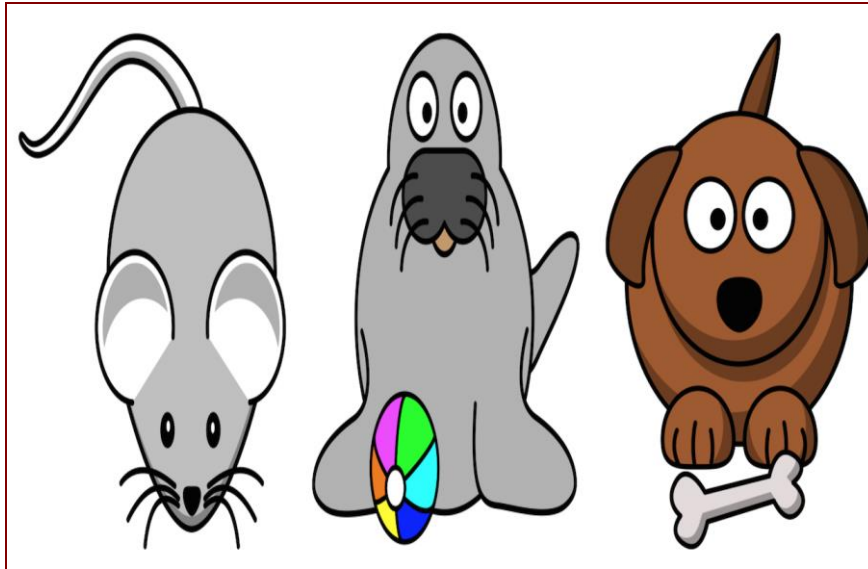


Figure 4.3 Familiarisation Task – Test Item 2

Spoken Instruction: Here is a mouse, a seal and a dog. Touch the dog.

This initial task took less than one minute to complete. Table 4.5 demonstrates the test items and instructions for the familiarisation task.

Familiarisation Task		
No.	Images	Instruction
Exemplar	1 large green box	‘Here is a box. Touch the box’.
1	2 large green boxes – one flashing	‘Touch the flashing box’.
2	A mouse A seal A dog	‘Here is a mouse, a seal and a dog. Touch the dog’.
3	A cat A bear A spider	‘Here is a cat, a bear and a spider. Touch the cat’.

4	A fly A bee A snake	'Here is a fly, a bee and a snake. Touch the bee'.
5	A cow A pig A fish	'Here is a cow, a pig and a fish. Touch the fish'.

Table 4.5 Images and instructions for the familiarisation task

4.7.2.3 Initial phoneme identity. This task consisted of one exemplar and 10 test items. The children were initially introduced to the image of an animal: a seal, which appeared on its own on the screen. The corresponding voice told the children that this animal had a favourite sound (the favourite sound is also the initial sound of the animal's name) and the favourite sound of the animal was played back to the children with emphasis. Three images were then shown below the target animal and their corresponding names were pronounced for the children (see Figure 4.4). The children were asked to identify the word that begins with the same sound as the animal's favourite sound by directly touching the corresponding target picture. This task took approximately four minutes to complete.

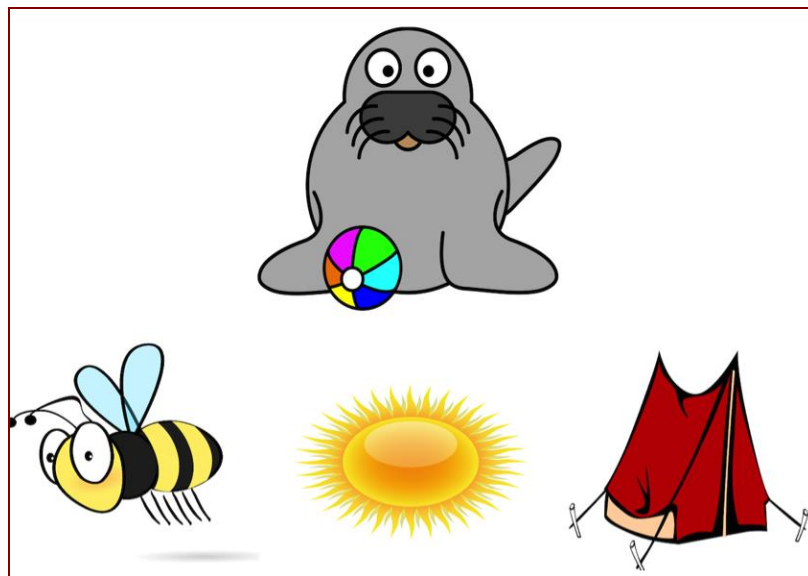


Figure 4.4 Initial phoneme identity task – Test Item 3

Spoken Instruction: Here is a picture of a seal. Seal likes words that start with the /s/ sound. Touch the word that starts with a /s/ sound? Bee, sun, tent?

Initial Phoneme Identity Task		
No.	Target Image	Options (correct responses highlighted in blue)
Exemplar	'Here is a picture of a dog. Dog likes words that start with the /d/ sound'.	'Touch the word that starts with the /d/ sound. Moon – Duck – Whale'.
1	'Here is a picture of a mouse. Mouse likes words that start with the /m/ sound'.	'Touch the word that starts with the /m/ sound. Doll – Bear – Milk '.
2	'Here is a picture of a mouse. Mouse likes words that start with the /m/ sound'.	'Touch the word that starts with the /m/ sound. Mat – Dog – Book'.
3	'Here is a picture of a seal. Seal likes words that start with the /s/ sound'.	'Touch the word that starts with the /s/ sound. Bee – Sun – Tent'.
4	'Here is a picture of a seal. Seal likes words that start with the /s/ sound'.	'Touch the word that starts with the /s/ sound. Saw – Tie – Hook'.
5	'Here is a picture of a cat. Cat likes words that start with the /k/ sound'.	'Touch the word that starts with the /k/ sound. Bus – Kite – Arm'.
6	'Here is a picture of a cat. Cat likes words that start with the /k/ sound'.	'Touch the word that starts with the /k/ sound. Comb – Dish – Soap'.
7	'Here is a picture of a bee. Bee likes words that start with the /b/ sound'.	'Touch the word that starts with the /b/ sound. Cat – Leg – Ball '.
8	'Here is a picture of a bee. Bee likes words that start with the /b/ sound'.	'Touch the word that starts with the /b/ sound. Car – Boat – Shoe'.
9	'Here is a picture of a fish. Fish likes words that start with the /f/ sound'.	'Touch the word that starts with the /f/ sound. Foot – Hat – Pig'.
10	'Here is a picture of a fish. Fish likes words that start with the /f/ sound'.	'Touch the word that starts with the /f/ sound. Duck – Bell – Fire '.

Table 4.6 Images and instructions for initial phoneme identity task

4.7.2.4 Final phoneme identity. The final phoneme identity task also consisted of one exemplar and 10 test items. In this task, the children were shown three images and

were asked to identify the word, from the choice of three, that ended with the target sound (see Figure 4.5). This task took approximately four minutes to complete.



Figure 4.5 Final phoneme identity task – Test Item 6

Spoken Instruction: Here is a hand, a horse and milk. Touch the picture that ends with the /d/ sound.

Final Phoneme Identity Task		
No.	Images (Correct responses highlighted in blue)	Instruction
Exemplar	Cat Can Man	‘Here is a cat, a can and a man. Touch the picture that ends with the /t/ sound’.
1	Room Seal Soup	‘Here is a room, a seal and soup. Touch the picture that ends with the /m/ sound’.
2	Hat Hole Sun	‘Here is a hat, a hole and a sun. Touch the picture that ends with the /t/ sound’.
3	Rope Rice Pan	‘Here is a rope, rice and a pan. Touch the picture that ends with a /s/ sound’.
4	Food Fan Hook	‘Here is food, a fan and a hook. Touch the picture that ends with a /d/ sound’.
5	Green	‘Here is green, grass and fire. Touch the picture that ends with

	Grass Fire	a /s/ sound’.
6	Hand Horse Milk	‘Here is a hand, a horse and milk. Touch the picture that ends with a /d/ sound’.
7	Ball Goat Bank	‘Here is a ball, a goat and a bank. Touch the picture that ends with a /k/ sound’.
8	Cake Camp Bed	‘Here is a cake, camp and a bed. Touch the picture that ends with a /p/ sound’.
9	World Walk Face	‘Here is world, walk and a face. Touch the picture that ends with a /d/ sound’.
10	Tent Toast Map	‘Here is a tent, toast, and a map. Touch the picture that ends with a /p/ sound’.

Table 4.7 Images and instructions for final phoneme identity task

4.7.2.5 Phoneme blending. This task consisted of two exemplars and 14 test items.

The children were asked to listen to a word, which was pronounced very slowly, phoneme by phoneme, with a one-second delay between each phoneme. They were then asked to select the corresponding image from a choice of three images. Within each test item, one distractor option was phonetically similar to the correct option to increase item difficulty; for example,

1. The first five items consisted of simple CVC words with one distractor containing the same initial phoneme as the correct option in each test item. For example, in Test Item 1, the correct answer was ‘dot’; a phonetically similar distractor option was ‘dog’; and a final non-similar option was ‘man’.
2. The second five items consisted of CCVC words where the initial consonant cluster between the correct option and one of the distractor options was identical. In Test Item 7, the correct answer was ‘crab’; the phonetically similar distractor option was ‘crane’; and the non-similar distractor option was ‘snake’.
3. The final four test items contain CVCC words with the final consonant cluster between the correct option and one of the distractor options being identical. In Test

Item 11, the correct option was ‘pond’; the phonetically similar distractor option was ‘point’; and, the non-similar distractor option was ‘fast’.

This task took approximately five minutes to complete.



Figure 4.6 Phoneme blending task – Test Item 5

Spoken Instruction: Here is a cat, a cap and a lock. Touch the picture that you think I’m saying: /c/ - /a/ - /t/.

Phoneme Blending Task		
No.	Images (Correct responses highlighted in blue)	Instructions
Exemplar	Cake Cap Ring	‘Here is a cake, a cap and a ring. I’m going to say one of these words very slowly. Touch the picture that you think I’m saying. (Sound out cake). Listen again’.
Exemplar	Sheet Sheep Mop	‘Here is a sheet, a sheep and a mop. I’m going to say one of these words very slowly. Touch the picture that you think I’m saying’.
1	Dog Dot Man	‘Here is a dog, a dot and a man. Touch the picture that you think I’m saying’.
2	Mouse Mouth Ring	‘Here is a mouse, a mouth and a ring. Touch the picture that you think I’m saying’.
3	Duck Seat Seal	‘Here is a duck, a seat and a seal. Touch the picture that you think I’m saying’.

4	Bug Sun Bun	'Here is a bug, a sun and a bun. Touch the picture that you think I'm saying'.
5	Cat Hat Lock	'Here is a cat, a hat and a lock. Touch the picture that you think I'm saying'.
6	Flip Drum Flag	'Here is a flip, drum and flag. Touch the picture that you think I'm saying'.
7	Crab Crane Snake	'Here is a crab, a crane and a snake. Touch the picture that you think I'm saying'.
8	Bread Spade Space	'Here is bread, a spade and space. Touch the picture that you think I'm saying'.
9	Tray Clown Train	'Here is a tray, a clown and a train. Touch the picture that you think I'm saying'.
10	Stop Star Plane	'Here is stop, a star and a plane. Touch the picture that you think I'm saying'.
11	Point Fast Pond	'Here is point, fast and pond. Touch the picture that you think I'm saying'.
12	Bank Band Toast	'Here is a bank, a band and toast. Touch the picture that you think I'm saying'.
13	Desk Lamp Lamb	'Here is a desk, a lamp and lamb. Touch the picture that you think I'm saying'.
14	Wand Mask World	'Here is a wand, a mask and the world. Touch the picture that you think I'm saying'.

Table 4.8 Images and instruction for phoneme blending task

4.7.2.6 Phoneme segmentation. This task consisted of two exemplars and 18 test items. In this task, the children were introduced to an image with five squares underneath it. They were required to listen carefully to all the sounds in the target word and to touch a square for each sound they heard. As they touched each square, the colour of the square changed from yellow to green. The order in which the children touched the squares did not make a difference to the score. This task took the children approximately six minutes to complete.

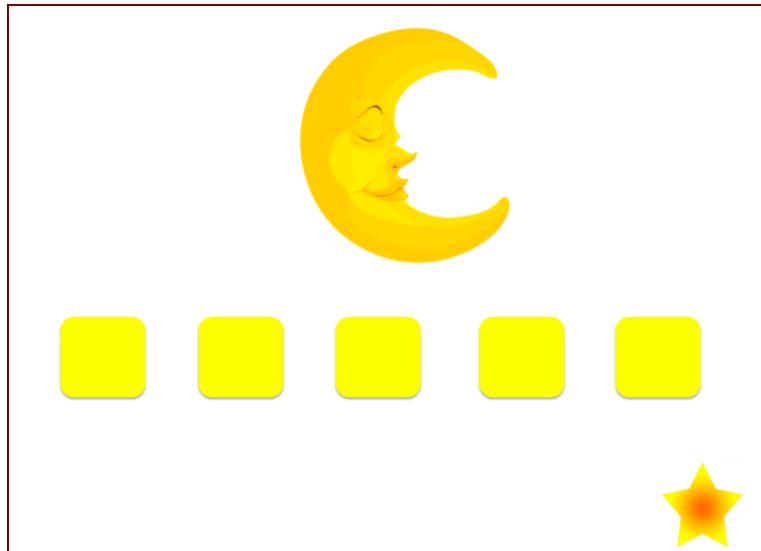


Figure 4.7 Phoneme segmentation task – Test Item 2

Spoken Instruction: Here is a picture of a moon. Say ‘moon’. Say ‘moon’ slowly and touch a yellow square for every sound you hear.

Phoneme Segmentation Task		
No.	Images (Correct number of boxes in blue)	Instructions
Exemplar	Sun 3 squares	‘This is a sun. I’m going to say ‘sun’ very slowly. Each time I say a sound in sun, I’m going to touch a yellow square. S – U – N. I hear three sounds in ‘sun’ so I’m going to touch three yellow squares’.
Exemplar	Bee 2 squares	‘This is a bee. I’m going to say ‘bee’ very slowly. Each time I say a sound in bee, I’m going to touch a yellow square. B – E. I hear two sounds in ‘bee’ so I’m going to touch two yellow squares’.
1	Dog 3 squares	‘Now it’s your turn. This is a dog. How many sounds do you hear in the word ‘dog’?’
2	Moon 3 squares	‘This is a moon. How many sounds do you hear in the word ‘moon’?’
3	Tooth 3 squares	‘This is a tooth. How many sounds do you hear in the word ‘tooth’?’
4	Cow 2 squares	‘This is a cow. How many sounds do you hear in the word ‘cow’?’
5	Cup 3 squares	‘This is a cup. How many sounds do you hear in the word ‘cup’?’
6	Soap	‘This is a bar of soap. How many

	3 squares	sounds do you hear in the word 'soap'?
7	Saw 2 squares	'This is a saw. How many sounds do you hear in the word 'saw'?'
8	Fly 3 squares	'This is a fly. How many sounds do you hear in the word 'fly'?'
9	Flush 4 squares	'This picture shows flush. We flush the toilet. How many sounds do you hear in the word 'flush'?'
10	Crab 4 squares	'This is a crab. How many sounds do you hear in the word 'crab'?'
11	Sew 2 squares	'This picture shows sew. How many sounds in do you hear in the word 'sew'?'
12	Step 4 squares	'This is a man on a step. How many sounds do you hear in the word 'step'?'
13	Plate 4 squares	'This is a plate. How many sounds do you hear in the word 'plate'?'
14	Star 3 squares	'This is a star. How many sound do you hear in the word 'star'?'
15	Lock 3 squares	'This is a lock. How many sounds do you hear in the word 'lock'?'
16	Jump 4 squares	'This is jump. How many sounds do you hear in the word 'jump'?'
17	Pond 4 squares	'This is a pond. How many sounds do you hear in the word 'pond'?'
18	Hand 4 squares	'This is a hand. How many sounds do you hear in the word 'hand'?'

Table 4.9 Images and instructions for phoneme segmentation task

4.7.3 Scoring for test items. All scores were recorded and stored automatically on a password-protected, online database called Parse. The child's ID number, gender and date of birth were also stored along with the date and time of the completed assessment. One point was allocated for each test item with a correct response. No points were given for incorrect test items. For the phoneme segmentation task, the children received one point for correctly identifying the number of phonemes in a word. If their answer did not match the correct number of phonemes exactly, they did not receive a point.

4.7.4 Multiple-choice format. Each task began with an exemplar and this was followed by ten to eighteen test items. Every item within each task was presented to the children in a multiple-choice format. According to Rodrigues (2005), the optimal number of options per multiple-choice test item is three. In three of the tasks (initial phoneme identity, final phoneme identity and phoneme blending), the multiple-choice options were

presented as static images. Each image appeared one at a time with the corresponding verbal naming of the image. The phoneme segmentation task was presented in a slightly different format. In this task, the children were required to tap on a square for each sound they heard in a spoken word. However, this also incorporated a multiple-choice response as five squares could be selected, giving a total of five possible options: one, two, three, four, or five squares.

The positioning of the correct response varied from item to item, to combat the possibility of a correct response being generated due to chance. In future, the development of an adaptive version of the assessment app would allow for a more responsive and more effective assessment of children's phonemic awareness skills. Adaptive tests allow the computer to choose from a large database of test items and adapt the test to meet the wide range of abilities evident in the classroom. Given the complex nature of developing such an adaptive test and the large bank of test items required to produce such a resource, it was beyond the scope of this research to produce such a tool; however, it is hoped that the iPad-based assessment app created as a result of this dissertation could provide a springboard for the creation of such a tool for assessing children's phonemic awareness in the classroom into the future.

4.8 Limitations of the iPad-based Phonemic Awareness Assessment App

It should be noted that the validity of the iPad-based phonemic awareness assessment tool was largely based on the validity of the existing computer-based assessment tool created by Carson et al. (2011), from which the iPad-based tool was based. Therefore, as the assessment app is not currently validated, it cannot be viewed as a definitive measure of phonemic awareness skills. In the context of this research, the phonemic awareness assessment tool may give indications of presence or absence of phonemic awareness skills, but substantial claims cannot be made until the app undergoes validation for this purpose. This undertaking was beyond the scope of this research but

this is an important area for future investigation to ensure that the app is a valid tool for teachers to use with confidence to measure and monitor children's phonemic awareness skills.

4.9 Chapter Summary

The aim of this chapter was to describe, in detail, the iPad-based phonemic awareness app that was employed to measure participants' phonemic awareness skills as part of this research study. The rationale for, and benefits of, introducing such an assessment tool were also emphasised in this chapter. As the tool was adapted from an existing computer-based assessment tool (Com-PASMA) developed by Carson et al.'s (2011), it was crucial to highlight the validity and reliability of Com-PASMA in order to justify the use of such a tool with confidence.

The iPad-based phonemic awareness assessment app developed by the researcher of this dissertation has a number of novel aspects in comparison to more traditional paper-based phonological awareness measurement tools. This form of assessment affords teachers the opportunity to

- assess children at the crucial phoneme level,
- assess a number of children in one sitting as the children self-administer the assessment,
- record and store children's scores automatically for later analysis.

From an educational design research perspective, the iPad-based phonemic awareness assessment app introduced in this dissertation attempts to solve the problems associated with more traditional methods of assessing phonological awareness as identified in Chapter Two, section 2.10. It addresses the time-consuming nature of implementing paper-based assessments, which, for the most part, requires assessing children on a one-to-one basis. In summary, the creation of the assessment app employed in this research is the

first use of an instrument of this kind in Ireland to measure Irish children's phonemic awareness.

The next chapter explores the creation of the explicit and systematic, teacher-led phonological awareness programme that was implemented in Study Two.

5.0 Design of the Implemented Phonemic Awareness Intervention

The rationale for creating and designing the implemented phonological awareness programme for Study Two, was to enable young children from lower socioeconomic backgrounds to build a strong foundation to support early reading skills such as decoding. Increasingly, both in Ireland and internationally, literacy intervention programmes are considered by policy makers and schools to inform decision-making, as well as by practitioners to influence how instruction is provided to improve pupil outcomes (Pressley, Graham, & Harris, 2006). Examples of implemented literacy interventions in Irish DEIS schools include the introduction of the *First Steps Programme* (Department of Education and Training in Western Australia, 2004) and *Reading Recovery* (Clay, 1993).

This chapter describes, in detail, the explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, that was implemented in Study Two to improve the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school. The chapter begins by framing the creation and evaluation of the programme within educational design research (EDR). The chapter demonstrates how the programme was shaped and implemented using the three phases of EDR: analysis/exploration, design/construction and evaluation/reflection. Van den Akker's (2003) Curricular Spiderweb, which provided a framework for the design of the programme, is also discussed. Finally, the chapter concludes with a summary of the key characteristics of the phonological awareness programme.

5.1 Phases of Educational Design Research and Programme Implementation

One of the primary aims of EDR is to find solutions to address real problems that exist in educational practice. EDR focuses on learning in authentic contexts through the design and study of instructional intervention programmes (Brown, 1992; Collins, 1992). In Chapter Three (Section 3.5.4), the Generic Model for EDR (McKenney & Reeves,

2012) was introduced (see Figure 5.1) and its three core phases, analysis/exploration, design/construction and evaluation/reflection, were explored.

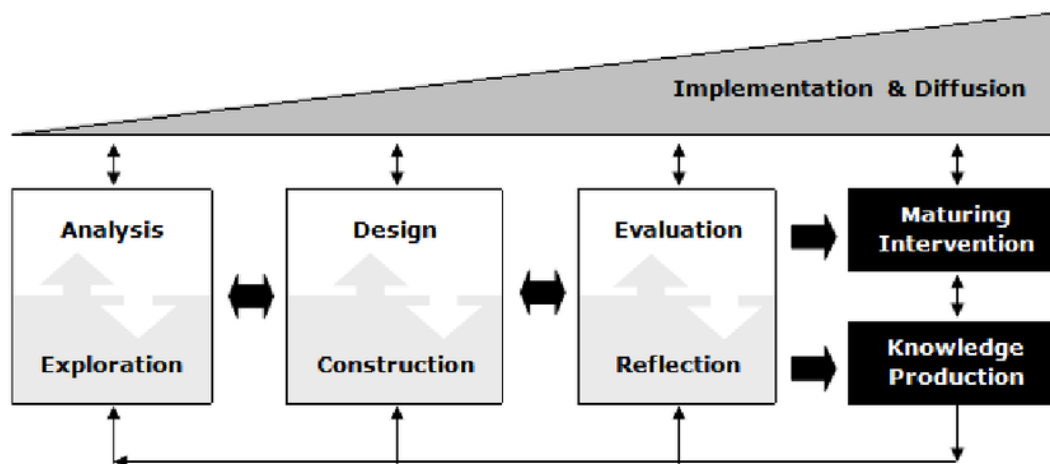


Figure 5.1 The Generic Model for Educational Design Research (McKenney & Reeves, 2012)

These three phases provide the structure for the remainder of this chapter, and the creation, implementation and evaluation of the phonological awareness programme will be examined under these headings in the subsequent sections.

5.2. Analysis and Exploration

The main goal of the analysis phase of EDR is problem definition. Once the problem has been defined, the exploration phase consists of ‘seeking out and learning how others viewed or solved a similar problem’ (McKenney & Reeves, 2012, p. 85). During this initial phase, a number of complex issues and problems pertaining to early reading and socioeconomic status were identified by the researcher: the most significant related to the gap in reading scores that continues to exist between children who attend DEIS urban Band 1 schools compared to their peers attending non-DEIS schools. As stated in the report on the National Assessment of English Reading and Mathematics (Shiel, Kavanagh, & Millar, 2014), ‘while substantive improvements have been made in DEIS schools since NA ’09, there has been no real reduction in the gap between children in DEIS urban schools and in other school types.... Therefore, it may be necessary to support the teachers,

parents and children in DEIS Band 1 schools even more intensively over the remainder of the National Strategy to reduce the gap with children in other school types' (p. xvi).

At this 'analysis' stage, a substantive literature review was conducted by the researcher in order to determine why such a problem exists. Much of the literature pointed to the importance of providing early intervention to prevent future reading problems (Bos et al., 2001; Coyne, Kame'enui, & Simmons, 2001). One early literacy skill that has been proven as a precursor to and predictor of children's later reading achievement is phonemic awareness (Adams, 1990; Ball & Blachman, 1991; Bradley & Bryant, 1983; Carroll & Snowling, 2004; Carson et al., 2013; Ehri et al., 2001, Gillon, 2004; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002). At this stage, Study One sought to establish whether junior infant children attending DEIS urban Band 1 schools begin formal schooling with lower levels of phonemic awareness.

As part of the exploration phase, the researcher gathered and examined research literature relating to phonological awareness instruction and the implementation of phonological awareness programmes. In an Irish context, little research evidence was available to the researcher; therefore, for the most part, international research studies informed the creation of the programme implemented in this dissertation.

From the analysis and exploration of the research literature, the researcher concluded that no phonological awareness programmes, devised specifically for Irish children/schools, could be identified. Consequently, a solution to this identified problem was for the researcher to design an explicit and systematic phonological awareness programme, focused at the crucial phoneme level, to be implemented in junior infants in a DEIS urban Band 1 school. Furthermore, to reflect the goals of EDR, the intervention would be implemented, co-constructed and evaluated by classroom teachers.

At this point, an analysis of the setting and context for the research was also undertaken. Discussions were held between the researcher and the stakeholders in relation

to instructional approaches and resources that might be available, and it was agreed that a team-teaching approach to instruction would be adopted, as this was already a significant approach in the school's junior infant classrooms. A needs analysis of the expert-teacher group also took place, and it was determined that the teachers would benefit from professional development in the area of phonological and phonemic awareness. As a result, two afternoons of professional development took place within the school before the intervention began. By the end of the analysis and exploration phase, the problem had been identified, a solution proposed, and a needs-analysis conducted of both the context within which the programme was to be implemented and the professional development needs of the expert-teacher group.

5.3 Design and Construction

Designing an intervention programme to be delivered by teachers to children in a classroom context requires consideration and collaboration if successful implementation is to occur. One challenge facing the researcher was to create balance and consistency between the various components within the programme. Influenced by the field of curriculum development, Van den Akker's (2003) Curricular Spiderweb was utilised by the researcher to guide the design of the phonological awareness programme. Van den Akker's Curricular Spiderweb emphasises ten key design elements that need to be addressed when designing programmes. A visual representation of the framework can be seen in Figure 5.2.

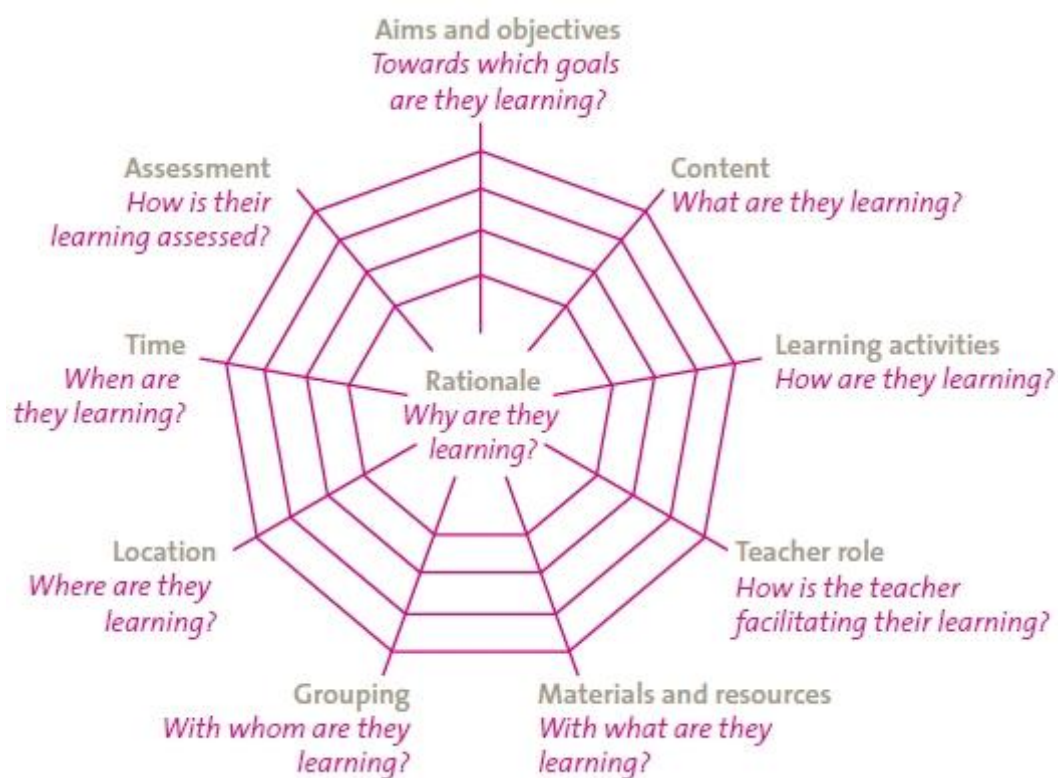


Figure 5.2 Curricular Spiderweb (Van den Akker, 2003)

Van den Akker's (2003) analogy of the spiderweb emphasizes the vulnerable nature of a curriculum or intervention programme. Although a spiderweb is relatively flexible, it will rip if certain threads are pulled at more strongly or more frequently than others. The Curricular Spiderweb, therefore, represents a familiar idiom: every chain is only as strong as its weakest link. The ten design elements identified by Van den Akker (2003) are as follows

- aims and objectives;
- content;
- learning activities;
- teacher role;
- materials and resources;
- grouping;
- location;

- time;
- assessment;
- an overall rationale.

These ten design elements also became the focus for discussion between the researcher and the expert-teacher group throughout the implementation and evaluation of the programme. In line with the responsive nature of EDR, the teachers provided feedback each week based on a number of these design elements in the form of teacher logs. This feedback then informed future development of the programme.

In addition to Van den Akker's (2003) Curricular Spiderweb framework, the components of effective phonological awareness intervention programmes (see Chapter Two, section 2.6) as described by Phillips, Clancy-Menchetti, and Lonigan (2008) were considered, however, many of these components, such as grouping and time, are already encompassed within Van den Akker's framework. In particular, Foorman and Torgesen's (2001) three features of instruction for children 'at-risk' of experiencing future reading difficulties – explicit, intensive and scaffolded instruction (see Chapter Two, section 2.11) – underpinned the design of the implemented programme. Using Van den Akker's framework, the creation and development of the researcher's implemented phonological awareness programme is discussed in the subsequent sections.

5.3.1 Aims and objectives. These were established early on before the development of the programme to provide a focus for its creation and were drawn up in collaboration with the expert-teacher group. The primary aim and four objectives (seen in the smaller circles) of the phonological awareness programme can be seen in Figure 5.3.

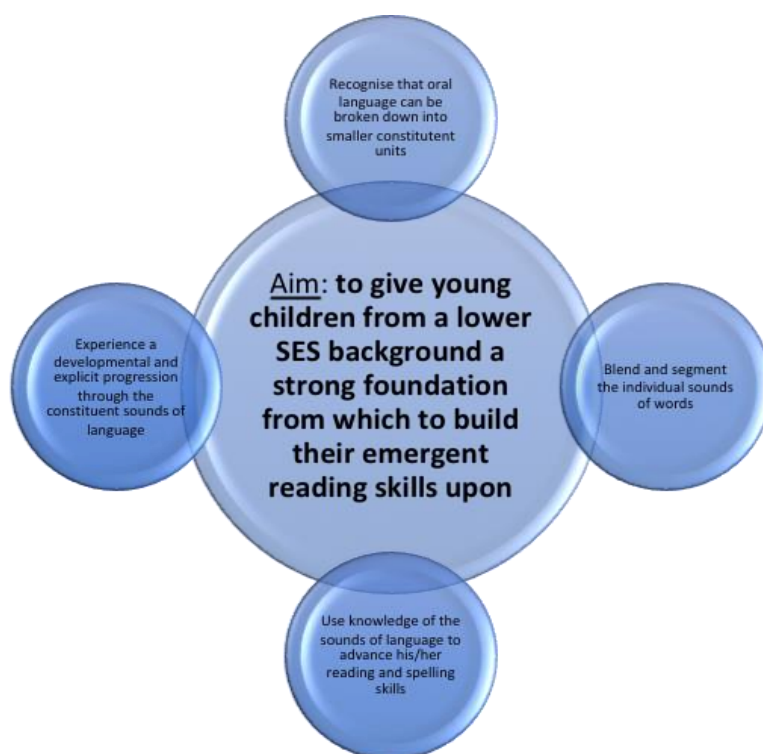


Figure 5.3 Aim and objectives of implemented phonemic awareness programme

5.3.2 Content. A number of important issues relating to the systematic and sequential nature of the content of the programme are discussed in this section. These issues, as outlined in Chapter Two, section 2.2.3, relate to the developmental progression of phonological awareness. In particular, three carefully considered issues included:

1. Linguistic complexity
2. Task complexity
3. Phoneme position

Linguistic complexity refers to the fact that a child's phonological awareness develops from larger to smaller units of sound (Adams, 1990; Anthony et al., 2002; Bryant et al., 1990; Cassady et al., 2002; Goswami & Bryant, 1990; Lonigan et al., 1998).

Therefore, in the implemented programme, word awareness is introduced before syllable awareness, and syllable awareness before onset-rime awareness. The pinnacle of the developmental progression is phonemic awareness, which is the phonological skill that was given the most attention in the implemented programme. The researcher felt that it

was important to move through the broader phonological units of sound as quickly as possible in order to spend more time focusing on the crucial phoneme-level skills, because research evidence reports that instruction at the phoneme-level is most successful in ensuring long-term improvements in reading ability (Adams, 1990; Ball & Blachman, 1991; Bradley & Bryant, 1983; Carroll & Snowling, 2004; Carson et al., 2013; Ehri et al., 2001; Gillon, 2004; Longian, 2003; Snow et al., 1998; Storch & Whitehurst, 2002). The research literature further contends that two phonemic awareness skills, in particular, are imperative to later reading and spelling: phoneme segmentation and phoneme blending skills. These two skills have demonstrated the most robust relationship with early reading skills (Cunningham, 1990; Gillon, 2005; Van Bon & Van Leeuwe, 2003; Yopp, 1988).

While some time was spent developing the children's broader phonological awareness skills (such as word awareness, syllable awareness and onset and rime awareness), the majority of the available instructional time was focused on instruction in phoneme-level skills (see Table 5.1). As a result, the initial four weeks of the implemented programme were spent developing broader phonological awareness skills, before the focus shifted to instruction in phoneme-level skills. Instruction in phoneme blending and segmentation skills were afforded more time than any other skill and six weeks of the programme was given over to instruction in these crucial skills (three weeks for each skill).

Task complexity also needed consideration in the design of the programme. According to Yopp (1988), certain tasks require children to perform more cognitive operations, thereby making some tasks more difficult than others. Consequently, all of the tasks in the implemented intervention consisted of *simple* phoneme awareness factors. These are tasks that require only one cognitive operation, such as identifying the initial sound in a word. The programme did not include *compound* phoneme awareness factors (eg. where children are asked to complete two or more operations, such as manipulating phonemes by adding a phoneme to make a new word), as these were considered too

challenging for the age group of the children in the study. Issues regarding the position of phonemes with words were also considered (Stanovich et al., 1984; Adams, 1990) and, as a result, instruction in the identification of initial phonemes in words preceded instruction in the identification of final phonemes.

Table 5.1 outlines the content that was covered over the course of the fourteen week implemented programme.

Week	Content
Week 1	Word awareness skills
Week 2	Syllable awareness skills
Week 3	Onset-rime awareness skills
Week 4	Rhyming skills
Week 5	Initial phoneme identification skills
Week 6	Initial phoneme identification skills
Week 7	Final phoneme identification skills
Week 8	Final phoneme identification skills
Week 9	Phoneme blending skills
Week 10	Phoneme blending skills
Week 11	Phoneme blending skills
Week 12	Phoneme segmentation skills
Week 13	Phoneme segmentation skills
Week 14	Phoneme segmentation skills

Table 5.1 Summary of content of implemented phonological awareness programme

It should be noted that the expert-teacher group began the Jolly Phonics programme directly after the completion of the phonological awareness programme. Due to the school

investing heavily in the Jolly Phonics programme, no instruction in letter-sound knowledge was included in the phonological awareness programme. However, the researcher of the current dissertation would contend that children should be taught how to blend and segment phonemes in words before being introduced to print, because if children cannot hear the individual sounds in spoken words they will struggle to map these sounds onto the letters of the alphabet when introduced. According to Snow et al. (1998) ‘because phonemes are the units of sound that are represented by the letters of the alphabet, an awareness of phonemes is key to understanding the logic of the alphabetic principle’ (p. 52).

The structure of the lessons also had to be considered by the researcher. Cunningham (1990) recommends five steps for delivering instruction in phonological awareness. These five steps include

1. Clearly informing the children of the objective of the lesson.
2. Revisiting the previous lesson and creating a clear connection between that lesson and the current lesson.
3. Modeling how to apply the skill and giving examples.
4. Practicing the new skill under the guidance of the teacher.
5. Embedding the skill within the context of reading activities.

Based on Cunningham’s recommendations, Table 5.2 represents the structure of the small-group and whole-class lessons:

Time allocation	Structure of Lessons
5 minutes	Review of previous lesson and outlining the objective of new lesson
20 minutes	Activities to support phonological awareness skill targeted for instruction that week, modelled by the teacher, and practiced by the children.
5 minutes	Shared reading with emphasis on phonological awareness skill targeted that week

Table 5.2 Structure of phonological awareness lessons

To summarize, the implemented programme took place over a fourteen-week period and the content of the intervention took into account the developmental nature of phonological awareness. The children were introduced to the larger units of sound before paying more attention to the smallest unit (ie. phonemes). It was crucial that the children were instructed in the skills of phoneme blending and phoneme segmentation as these skills are considered vital precursors to later decoding ability.

5.3.3 Learning activities. In recognition of the conceptual framework of this dissertation – emergent literacy - it was imperative that the learning activities included in the programme were enjoyable for young children to engage in. As previously discussed in Chapter Two, section 2.5, the researcher wanted to ensure that children were explicitly and systematic exposed to instruction in phonemic awareness; however, this did not require a need to revert to drill-like instruction. For the most part, child-friendly, table-top games were incorporated into the programme. In consideration of the age range of the children, the learning activities were introduced as brief, hands-on, motivational games. Where possible, the researcher attempted to incorporate other aspects of literacy when engaging the children in the phonological awareness activities. For example, when working on phoneme segmentation, the children were asked to count the number of phonemes in a CVC word and use a tweezers to move the number of pompoms that represented the identified sounds into an bowl (see Figure 5.4). As a result, the children were strengthening their fine motor skills for handwriting, while receiving instruction in phoneme segmentation.



Figure 5.4 Phoneme segmentation activity integrating the development of fine motor skills

The following sections outline a range of learning activities that were incorporated into the phonological awareness programme.

5.3.3.1 Syllabification activities. Figure 5.5 demonstrates one of the syllabification activities included in the programme. In this activity, the children were presented with an image of a one-, two- or three-syllable word. They were required to say the word, count the syllables and turn on a light for each syllable they heard.



Figure 5.5 Syllabification light activity

Figure 5.6 illustrates another syllabification activity, which required the children to turn over a picture card, count the syllables in the word and place the picture card in the corresponding tub.



Figure 5.6 Syllable tubs activity

A particularly useful aspect of these activities was that these same activities could be revisited when the children were introduced to phoneme segmentation skills. Instead of identifying syllables, they were used to identify the number of individual phonemes in a word.

5.3.3.2 Onset-rime activities. Figure 5.7 demonstrates an example of one of the onset-rime activities. In this guessing game, the children are shown three picture cards. The teacher gives the children a clue that relates to the onset and rime of the target word; eg. ‘This word begins with /c/ and rhymes with snake’. From the clue the children have to identify the correct corresponding image.



Figure 5.7 Onset-rime guessing game

5.3.3.3 Phoneme identity activities. As reported by the expert-teacher group, the ‘Feed the Monster’ game was one of the children’s favourite activities. In this activity (see Figure 5.8), the ‘monster’ only eats words that begin/end with a target sound. The children identify the picture cards that correspond with the target sound and, if correctly identified, are able to ‘feed’ it to the monster. This activity was later reused by the teachers when introducing phonics instruction to get children to focus on the initial letter in words.



Figure 5.8 Feed the Monster phoneme identity activity

5.3.3.4 Phoneme blending activities. This activity in Figure 5.9 was a hands-on, engaging activity for the children, which incorporated an element of competition. In this activity, the children were presented with three picture cards. Two children were given fly swatters and the teacher said one of the words very slowly; eg. /e/ - /g/. The children were required to blend the sounds together and swat the corresponding picture cards before their opponent.

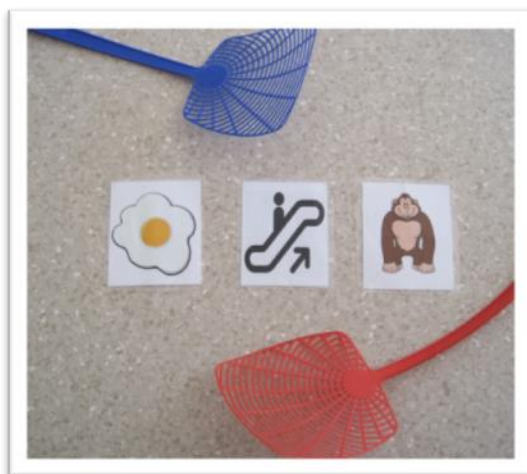


Figure 5.9 Phoneme blending fly swat activity

5.3.3.5 Phoneme segmentation activities. One of the phoneme segmentation activities was adapted from the idea of Elkonin boxes. In 1973, a Russian psychologist named D.B. Elkonin, introduced the use of sound boxes (Elkonin boxes) in his work with preschool children. To use Elkonin boxes, a child listens to a word and moves a counter into a box for each sound or phoneme heard (see Figure 5.10).

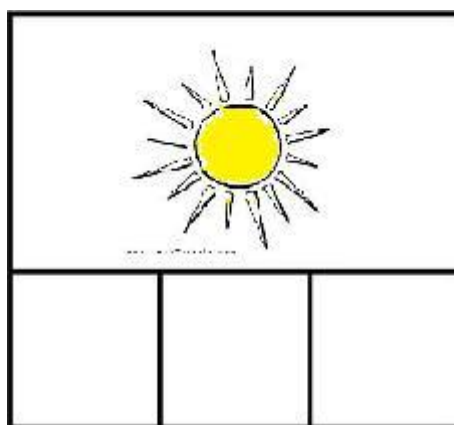


Figure 5.10 Example of Elkonin box

To make this activity more engaging, the children were shown a picture card and were asked to segment the word on the card. The children had to park a car in a carpark space for each sound/phoneme they heard in the word (see Figure 5.11).



Figure 5.11 Car park phoneme segmentation activity

To accompany the explicit instruction the children received, the expert-teachers were also asked to embed what had been learned in shared reading activities and supplement what had been taught in the small-group sessions informally as much as possible throughout the school day. For example, the teachers were given a list of other possible activities, songs, and rhymes they could introduce during the school day to enhance and support the children's developing phonemic awareness skills. The expert-teachers were also given examples of how phonological awareness skills could be introduced into other curriculum areas, such as physical education, and they were also encouraged to reinforce the newly-acquired phonemic awareness skills through *Aistear* activities.

5.3.4 Teacher's role. In educational design research (EDR), the end users of an intervention programme contribute to the design process. This means that the researcher's knowledge is further informed by insights offered by the expert-teachers who were implementing the programme. Therefore, the role of the expert-teachers in Study Two was twofold. They were required to not only implement the programme but also to evaluate and co-construct it during the lifetime of its implementation.

Perhaps one of the most challenging aspects of teaching phonological and phonemic awareness skills to young children is that you cannot *make* a child analyse the

sound structure of language. Rather, the teacher must repeatedly model how to reflect on the sounds of language. The use of the ‘think-aloud’ strategy (Van Someren, Barnard, & Sandberg, 1994) can be highly effective when teaching young children in this regard. This strategy requires the teacher to model his/her thought processes for children as s/he is working through and learning a new skill. This strategy is embedded within the Gradual Release of Responsibility model (Pearson & Gallagher, 1983). This model of instruction suggests that cognitive work should shift slowly and intentionally from teacher modelling, to joint responsibility between teachers and children, to independent practise and application by the learner (Pearson & Gallagher, 1983). Pearson and Gallagher’s model of instruction requires that the teacher shift from assuming ‘all the responsibility for performing a task ... to a situation in which the students assume all of the responsibility’ (Duke & Pearson, 2002, p. 211).

The Gradual Release of Responsibility model underpinned the explicit instruction provided by the teachers in this programme. During implementation, the class teachers first modelled the new skill, through the use of the think-aloud strategy, for the children; for example, ‘Here is a picture of a cat. I’m going to say the word very slowly, c – a – t. I’m going to say the word again and listen very closely for the first sound that I can hear in the word c – a – t. I can hear the sound /c/ at the beginning of the word.’ After this, the teacher involved the children in some guided instruction, where the teacher scaffolded the children as they attempted the new skill; for example, ‘Now here is a picture of a bus. Can you say the word very slowly? What sound can you hear at the beginning of the word?’ After the guided instruction, the children worked collaboratively to strengthen and further apply the new skill. This was generally accomplished through the use of a game-like activity as outlined in previous sections. The ultimate goal of the model was for the children to be able to apply the new skill independently. Therefore, the role of the teacher was that of a facilitator of the children’s learning. Each session would conclude with a

read aloud session where the teacher would read aloud a picture book for the children, emphasising an aspect of a newly learned skill; for example, the teacher might look at an illustration of a ladybird in a book such as ‘What the Ladybird Heard’ by Julia Donaldson and ask the children how many syllables the word ‘ladybird’ has or inquire what sound the word ‘ladybird’ begins with?

One further consideration – and perhaps one of the most important considerations when instructing children in phonological awareness – was ensuring the teachers knew the correct articulation of each phoneme. This was addressed during the delivery of the second professional development session. During this session, the expert-teachers were made aware of both stop sounds and continuous sounds. Stop sounds should only be said for an instant; for example, the sound /b/. Holding this sound for any longer distorts the sound. It is critical that teachers do not add an ‘uh’ sound to the end of a stop sound such as /b/ as this can cause confusion when the blending of phonemes is introduced. Likewise, continuous sounds must be articulate and clear. When introducing a continuous sound such as /m/, the sound should be made in a monotone fashion and not introduced in a ‘singsong’ voice, because, once again, doing so can cause confusion later when children are blending and segmenting sounds.

5.3.5 Materials and resources. As previously mentioned, the researcher reviewed numerous available phonological awareness programmes as part of the analysis phase of the research. Few of these programmes looked comprehensively or specifically at instruction at the phoneme-level, apart from *Phonemic Awareness in Young Children* (Adams, Foorman, Lundberg & Beeler, 1998). Therefore, the researcher incorporated aspects of this programme alongside aspects from a number of other programmes when devising the programme that was implemented as part of this research. While the researcher made use of a range of activities from *Phonemic Awareness in Young Children* (1998), she also adapted many of these activities to make them more child-friendly. For

example, one activity from Chapter Eight, introduces two-sound words, where the children are expected to say a two-phoneme word and move a block for each sound they heard. The researcher adapted this activity by asking the children to move toy cars into parking spaces for each sound they heard instead of moving blocks. This made the activity more engaging and relevant for the children.

The Florida Center for Reading Research (FCRR) is a multidisciplinary research centre based in Florida State University and explores many aspects of reading research. It has at the core of its mission the dissemination of research-based practices related to literacy instruction. The center produced a Teacher Resource Guide for student-centred activities that also became an important resource when developing the implemented programme. However, as the programme progressed, it became clear from the teachers' feedback that the FCRR activities needed to be adapted for Irish children and for an Irish context.

It became clear that the images (small in size and produced in black and white) needed to be adapted, as some contained uncommon vocabulary for Irish children; for example, 'nickel'. Therefore, new images were provided by the researcher that were bigger, more colourful, and more relatable in an Irish context (see Appendix J). Also, the expert-teacher group felt that many of the words in the FCRR programme were too long (over six phonemes in length). Consequently, it was decided that only CVC words would be used with the junior infant children. Other games and activities that were incorporated into the programme included games from the *Phonological Awareness Literacy Screening (PALS)*, as well as games that the researcher had used in her own teaching in the past.

One additional learning resource that the researcher was keen to introduce was mirrors. Research conducted by Castiglioni-Spalton and Ehri (2003) investigated whether the introduction of articulatory gestures could be an aid to children learning to segment phonemes. They argued that, as speech is both abstract and fleeting, once a word has been

said it no longer exists, and this can be a challenge for some children when developing phonemic awareness. This is unlike printed text, which is permanent in nature.

Consequently, in their study, mirrors were introduced for children to examine their mouth positions as they articulated various sounds. As part of the implemented programme, mirrors were included as a resource that the teachers could use during instruction.

Each term, the teachers were provided with a box of resources that contained a folder for each phonological awareness skill to be introduced; for example, initial phoneme identity, phoneme blending, etc. Each folder contained a comprehensive description of the learning activities to be introduced and how to conduct them (see Appendix K). Also, all of the required resources (board games, counters, puppets, beads for threading) were provided for each classroom. The folder included a teacher log, which each teacher filled in as they completed a new phonological awareness activity. Finally, the folder contained additional individual extension activities, as well as activities that could be completed as a whole class, that would support the work that was undertaken in the smaller groups. The rationale for grouping the children in small groups will be elaborated upon in the next section.

5.3.6 Grouping. Almost all evidence-based phonological and phonemic awareness intervention programmes conducted with young children have been conducted with individual children or in small groups (Ehri & Roberts, 2006; Lonigan, Anthony, Phillips, Purpura, Wilson, & McQueen, 2009). In its report, The National Reading Panel (NICHD, 2000) advocated that a small-group setting (2 to 7 children) is particularly relevant when teaching phonemic awareness. Working in small groups allows for more focused instruction at the ability level of individual children, while also allowing the teacher the necessary time to assess the strengths and needs of the individual children within the group.

Consequently, for the purposes of the programme implemented in this research, small groupings were utilised. As previously mentioned in section 5.2, team teaching was already a feature of the junior infant classrooms in the school in which the research was conducted. In the context of this research, team teaching consisted of two learning-support teachers, one class teacher and one special needs assistant working with small groups of approximately five children (four groups in total) for one hour each morning in each junior infant classroom. The one-hour session was divided between literacy and numeracy activities. It was decided that the programme would be conducted in small groups during this team-teaching session. Therefore, twice a week, the children received thirty minutes of explicit instruction in a small-group setting. A further thirty minutes of instruction in phonological awareness instruction was conducted by the teacher as a whole class, once per week. Overall, introducing the intervention through team teaching proved very effective as it resulted in little or no disruption to the children's regular routine and allowed for more differentiated instruction. While the researcher would have liked more instruction to have occurred in the team-teaching setting, timetabling restrictions meant that time had to be given to other aspects of the curriculum during these sessions.

5.3.7 Location. As the real-world setting of classrooms tends to be very complex and unpredictable, the only context in which to adequately explore intervention programmes, is with practitioners in the target context (Design-Based Research Collective, 2003; Van den Akker, 1999). Educational design research (EDR) seeks to investigate intervention programmes in naturally occurring test beds, such as the classroom, so as to address usability issues and to portray the setting for which the intervention was created.

Until recently, the majority of phonological awareness intervention studies have been conducted in controlled research settings using small groups outside of the classroom (Brady, Fowler, Stone, & Winbury, 1994; Ehri et al., 2001; Gillon, 2005; Gillon & McNeill, 2009). Consequently, less is known about the effectiveness of such instruction

when implemented by teachers within their own classrooms. This current research attempts to address this shortcoming as the implemented phonological awareness programme took place within junior infant classrooms in a DEIS urban Band 1 school.

5.3.8 Time. While there is general agreement that instruction in phonemic awareness is a critical element of teaching children to read, less is known about the optimal duration and intensity of such instruction. Importantly, it was vital that the implemented programme was integrated as part of the existing curricular time. This was a significant consideration to ensure the longevity of the programme, because the Irish primary school curriculum is already considered ‘overcrowded’. In 2010, the National Council for Curriculum and Assessment (NCCA), published a report entitled *Curriculum Overload in Primary Schools*. The report suggested that ‘the sheer depth of and breadth of the totality of subjects all contribute to curriculum overload’ (p.14). The report also highlighted that time was one of the greatest challenges in implementing the Irish primary school curriculum. Therefore, when designing the intervention, optimal duration and intensity were strong considerations. Duration is defined as the total length of the intervention and intensity is defined as the frequency of the intervention.

According to the research literature, it appears that a little goes a long way when providing instruction in phonological awareness. The National Reading Panel (NICHD, 2000) found that 5 to 18 hours of instruction or intervention provided substantial benefit to children, with longer programmes not necessarily leading to greater benefit. Frequent and intensive sessions are an important component of effective phonological awareness instruction (Elbaum, Vaughn, Hughes, & Moody, 1999; Gillon, 2004). According to Gillon (2004), instruction focused at the phoneme level for 20 hours over a 10-week period has proved sufficient for raising reading achievement in at-risk populations in individualised and small group therapy settings.

An analysis of four research studies, which included teacher-led instruction and focused on teaching phonological awareness in a classroom environment, was conducted by Carson et al. (2013). These studies were categorised according to duration, intensity and content. Studies that implemented programmes for more than one year were considered long in duration, while those implemented for less than a year were considered short. Implemented programmes that consisted of two hours or more of instruction per week were considered highly intensive, while programmes involving less than two hours were viewed as low in intensity. Finally, the content of the studies were considered. Studies that targeted phonological awareness at the phoneme-level were classified as narrow, while studies targeting a wide range of phonological awareness skills were considered broad. Table 5.3 compares the duration, intensity and content of the four studies analysed by Carson et al. (2013).

	Duration		Intensity		Content		Reading Outcomes	
	Long	Short	High	Low	Broad	Narrow	Immediate	Sustained
Shapiro & Solity (2008)	X		X			X	X	X
McIntosh et al. (2007)		X	X		X		X	
Fuchs et al. (2001)		X		X	X		X	
Justice et al. (2010)		X		X	X		X	

Table 5.3 Duration, intensity and content of classroom phonological awareness instruction on reading outcomes

**Note: 'Immediate reading outcomes' refers to improvements demonstrated immediately after the programme's conclusion; 'Sustained reading outcomes' refers to reading improvements still evident when measured up to 5 months post-instruction.*

As can be seen from Table 5.3, Shapiro and Solity's (2008) study, which was long in duration, high in intensity, and focused on phonological awareness at the phoneme level, resulted in sustained benefits for reading growth. A considerable drawback of their study,

however, included the adaptation of the entire school day in order to incorporate their intervention programme. While this was not a realistic possibility in the context of the current research; nonetheless, the researcher was eager to examine whether the introduction of a programme that was short in duration, high in intensity and focused instruction at the crucial phoneme level would be effective in raising and sustaining the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school. Consequently, the implemented programme was delivered over a 14-week period for one-and-a-half hours per week in both small-group and whole-class settings with supplemental informal instruction being provided during the week.

5.3.9 Assessment. An iPad-based phonological awareness assessment tool was designed to assess the children’s phonemic awareness skills at three intervals during their first year of formal schooling. This tool was comprehensively discussed in Chapter Four.

5.3.10 Section summary. Table 5.4 gives an overview of the design elements, as proposed by Van den Akker (2003), that were considered and addressed in the development of the phonological awareness programme implemented in Study Two of this dissertation.

Design Element	Phonological Awareness Intervention
Aim	<ul style="list-style-type: none"> • To give children from lower socioeconomic backgrounds a strong foundation upon which to build future reading achievement
Content	<ul style="list-style-type: none"> • Reflected developmental progression of phonological awareness • Attention given to linguistic and task complexity • Focused at crucial phoneme level • Particular attention paid to phoneme blending and segmentation
Learning Activities	<ul style="list-style-type: none"> • Hands-on, engaging activities • Games-based
Teachers’ Role	<ul style="list-style-type: none"> • Implementor, evaluator and co-constructor of the phonological awareness programme • Facilitator of learning • Applied the Gradual Release of Responsibility model and scaffolded children’s learning • Explicit and systematic instruction • Applied think alouds and modeled new skills

	<ul style="list-style-type: none"> • Supported new learning with informal teaching
Materials & Resources	<ul style="list-style-type: none"> • Child-friendly, attractive, colourful resources • Games-based activities • Relevant in an Irish context
Grouping	<ul style="list-style-type: none"> • 2 x small group session (4 to 6 children per group) • 1 x whole class lesson
Location	<ul style="list-style-type: none"> • Teacher's own classroom
Time	<ul style="list-style-type: none"> • Duration of intervention: 14 weeks • Intensity of intervention: 90 minutes per week • Each lesson 20 to 30 minutes
Assessment	<ul style="list-style-type: none"> • iPad-based phonological awareness assessment app

Table 5.4 Overview of design elements of implemented phonological awareness programme (O'Sullivan, 2018)

5.4 Evaluation and Reflection

On an informal basis, the evaluation phase continued throughout the implementation of the programme as the expert-teacher group gave continuous feedback from week to week based on the design elements outlined in this chapter. This feedback was reflected upon by both the researcher and the teachers, and this often resulted in changes being made during the course of the implementation. It should be noted that informal evaluation is a constant feature of EDR. On a more formal basis, data was collected at three stages during the implementation of the programme and the data analysed. More detailed information regarding the findings from this data will be reported in the next chapter.

In EDR, 'reflection involves active and thoughtful consideration of what has come together in both research and development with the aim of producing new understanding' (McKenney & Reeves, 2012, p.151). Reflections and further discussion in consideration of the findings will be presented in Chapter Seven of this dissertation. Such reflections will be presented in the form of design principles, which will attempt to enhance our understanding of the implementation of phonological awareness programmes in a classroom setting.

5.5 Chapter Summary

In summary, the key characteristics of the implemented phonological awareness programme developed using the Curricular Spiderweb framework (Van den Akker, 2003) were as follows:

- The content was primarily focused at the crucial phoneme level and was delivered in an explicit and systematic manner to reflect the developmental progression of phonological awareness.
- The duration of the intervention was fourteen weeks and ran from October to February.
- The intervention was conducted three times a week for thirty minutes (and supplemented with additional, informal, whole-class teaching)
- The activities were predominately hands-on, games-based activities, using child-friendly images and resources. Mirrors were also incorporated to study the children's mouth movements.
- The intervention adopted the Gradual Release of Responsibility model (Pearson & Gallagher, 1983), and required teachers to make use of the think-aloud strategy during instruction.
- The intervention was conducted in junior infant classrooms in a DEIS urban band 1 school and was teacher-led.

The subsequent chapter, Chapter Six, will present the findings of both Study One and Study Two and provide an initial analysis of the implications of the results.

6.0 Findings

The findings chapter presents the results of Study One and Study Two. The chapter will be introduced in three sections to reflect the dissertation's three research questions. The first section addresses the first research question and details the results of Study One, which examined whether Irish junior infant children from lower socioeconomic backgrounds begin primary school with lower levels of phonemic awareness. This study was also conducted as part of the first phase of the EDR process, to analyse and evaluate whether there was a need to introduce a phonological awareness programme to junior infant children attending a DEIS urban Band 1 school.

The second section addresses the second research question and presents the findings from Study Two, which examined whether the introduction of an explicit, teacher-led phonological awareness programme, focused at the crucial phoneme level, could improve the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school. The initial findings from Study One and Study Two will be presented in a quantitative format. A brief discussion will take place after the results of each study have been presented. These discussions will relate to specific issues that arose from the findings, while a more general discussion will take place in Chapter Seven.

The third, and final, section of this chapter acknowledges the research design of this study – educational design research – which highlights that there is not only a need to examine whether an programme works but also to examine 'how' or 'why' it is or is not effective. This final section will present the findings of the qualitative data gathered in this research in order to determine the effective characteristics of the phonological awareness programme implemented in this research. It is proposed that an examination of these characteristics will aid in the generation of design principles that will further our

understanding of the implementation of such intervention programmes in educational settings into the future.

6.1 Study One: Comparison of the Phonemic Awareness Skills of Junior Infant Children Attending DEIS and non-DEIS Schools

In this study, three cohorts of junior infant children (n = 107) were assessed during the third week of September in their first year of formal schooling. Table 6.1 highlights the number of children in each cohort. As mentioned in Chapter Three, section 3.11.2, two cohorts of children were assessed in the DEIS school. One in 2015 (DEIS15) and the second cohort in 2016 (DEIS16). The 2015 cohort acted as the control group in Study Two.

	Non-DEIS cohort	DEIS15 cohort	DEIS16 cohort
Number of children (n)	40	35	32

Table 6.1 Number of children in each cohort

Two phonemic awareness skills were assessed in Study One; initial phoneme and final phoneme identity, using the iPad-based assessment app. Prior to the assessment, the children did not receive any explicit instruction in phonemic awareness. In fact, the children were assessed in week three of September and, consequently, had received very little instruction at the time the assessment was conducted, because they had just begun formal schooling. Both the initial phoneme and final phoneme identity tasks were scored out of a maximum of ten points. The children were assessed on only two phonemic awareness tasks at this point, as research suggests that more challenging tasks, such as phoneme blending and segmentation, are developmentally very difficult for young children of this age to complete (Carson et al., 2011; Moats, 2003).

Statistics Package for Social Science (Version 23.0) was used to analyse the study data and the means (M) and standard deviations (SD) of the scores achieved for each task are shown on Table 6.2 and are displayed in Figure 6.1.

	Initial Phoneme Identity	Final Phoneme Identity
	Mean (SD)	Mean (SD)
Non-DEIS (n=40)	6.58 (2.94)	3.75 (1.82)
DEIS15 (n=35)	4.06 (2.05)	3.11 (1.18)
DEIS16 (n=32)	4.22 (2.16)	3.10 (1.64)

Table 6.2 Means and standard deviations in performance on phonemic awareness tasks by average and low SES groups

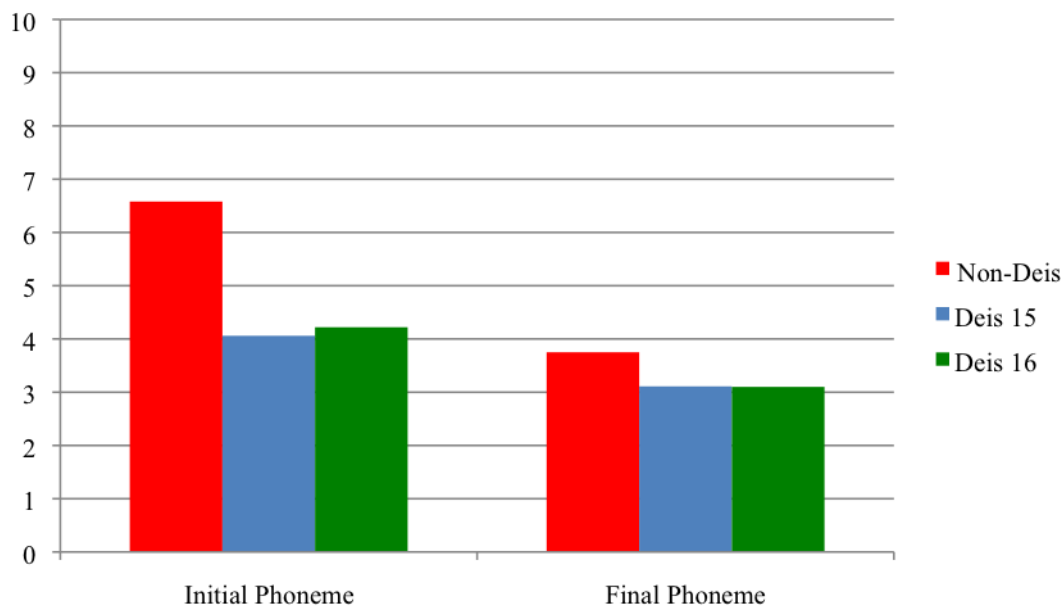


Figure 6.1 Mean score achieved on initial phoneme and final phoneme identity task by school status at beginning of school year

A one-way between-groups analysis of variance (ANOVA) was conducted to compare the variability in scores between the three cohorts on the two phonemic awareness tasks. As can be seen from Table 6.2, there was very little mean difference between the scores achieved by DEIS15 and DEIS16 on both tasks. The results from these two groups

strengthen the argument that children attending DEIS urban Band 1 schools begin school with lower levels of phonemic awareness skills than their peers attending non-DEIS schools, as both DEIS cohorts displayed lower levels of phonemic awareness, in comparison to the non-DEIS children, even when assessed on two separate occasions.

6.1.1 Initial phoneme identity task. The results of the ANOVA indicated that there was a statistically significant difference at the $p < .05$ level on the initial phoneme identity scores for the three SES groups ($F=(2,104) = 12.40, p < 0.001$). The high F value here indicates that the data does not support the null hypothesis, which states that there would be no variation in the mean scores of all three groups. While the one-way between-groups ANOVA indicated the level of variability between the three groups was high, it was necessary to conduct post-hoc testing to establish where the variation between the three groups lay and to compare the mean scores within the three groups. The results (see Table 6.3) indicated that junior infants children attending the non-DEIS school performed better on the initial phoneme identity task than the DEIS15 and DEIS16 junior infants. Table 6.3 represents the post-hoc comparisons between the groups on the initial phoneme and final phoneme identity task using the Tukey Honestly Significant Different (HSD) test.

Dependent Variable	(I) Status	(J) Status	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
IP1	Non-DEIS	DEIS15	2.518*	.568	.000	1.17	3.87
		DEIS16	2.356*	.582	.000	.97	3.74
	DEIS15	Non-DEIS	-2.518*	.568	.000	-3.87	-1.17
		DEIS16	-.162	.601	.961	-1.59	1.27
	DEIS16	Non-DEIS	-2.356*	.582	.000	-3.74	-.97
		DEIS15	.162	.601	.961	-1.27	1.59
FP1	Non-DEIS	DEIS15	.636	.366	.197	-.23	1.51
		DEIS16	.653	.379	.201	-.25	1.55
	DEIS15	Non-DEIS	-.636	.366	.197	-1.51	.23
		DEIS16	.018	.390	.999	-.91	.95
	DEIS16	Non-DEIS	-.653	.379	.201	-1.55	.25
		DEIS15	-.018	.390	.999	-.95	.91

*. The mean difference is significant at the 0.05 level.

Table 6.3 Results of Tukey post-hoc testing between groups

Tukey's HSD post-hoc tests revealed there was no significant difference between scores of DEIS15 and DEIS16 on measures of initial phoneme awareness.

6.1.2 Final phoneme identity task. Interestingly, there was no significant difference at the $p < .05$ level on the scores achieved in the final phoneme identity task for all three cohorts: $F(2,104) = 1.36$, $p = 0.259$. As can be seen from Table 6.3, Tukey's HSD post-hoc tests revealed that there was little significant difference between all three cohorts on the final phoneme identity task.

6.1.3 Study One: Discussion. The findings from the initial phoneme identity task support international research that demonstrates that children from lower socioeconomic backgrounds often present with delays in the development of phonological awareness skills (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997). In their study, McIntosh et al. (2007), assessed children's ability to isolate initial phonemes

using the Primary and Preschool Inventory of Phonological Awareness - PIPA (Dodd et al., 2000). They found that children from lower socioeconomic backgrounds performed well below their average socioeconomic counterparts (see Table 6.4).

	Low SES Group	Average SES Group
	Mean Score	Mean Score
Phoneme Isolation	1.01	5

Table 6.4 McIntosh et al. (2007) comparison of low SES group mean raw scores with average SES group on PIPA phoneme isolation subtest

It would appear from the initial phoneme identity results that Irish children, who are entering formal schooling from areas of socioeconomic disadvantage, present with lower levels of phonemic awareness skills than their counterparts residing in more average socioeconomic areas. It is beyond the scope of this dissertation to investigate why children attending the DEIS school presented with lower level of phonemic awareness upon entering formal schooling; however, it is an area that requires further investigation.

Interestingly, the results from the final phoneme identity task demonstrated that all three cohorts of children achieved low scores on this particular task regardless of socioeconomic background. As discussed in Chapter Two, section 2.5.6.5, research has found that the ability to identify the initial sounds in words is considered an easier task than identifying the final sounds in words (Adams, 1990; Cassady et al., 2008; Stanovich et al., 1984). Therefore, the identification of the final phoneme in words is considered a more complex task for children to complete and this could explain why all of the children in Study One found this a challenging task at school entry regardless of socioeconomic background.

Overall, findings from this first study suggest that young children from areas of socioeconomic disadvantage begin formal schooling with a deficit in their ability to identify the initial phonemes in spoken words. These findings prompted the researcher to create and implement an explicit and systematic, teacher-led phonological awareness

programme, focused at the crucial phoneme level, in an attempt to improve the phonemic awareness skills of children attending a DEIS urban Band 1 school. The next section presents the results of Study Two, and examines whether the implementation of such a programme appeared to improve these children's phonemic awareness skills.

6.2 Study Two: Evaluation of Performance Pre-/Post-Delivery of a Phonological Awareness Programme

As discussed in Chapter Three, the researcher adopted a quasi-experimental design to determine whether the implementation of a phonological awareness programme, focused at the crucial phoneme level, had the potential to positively affect the phonemic awareness skills of junior infant children attending a DEIS urban Band 1 school. Study Two assessed four phonemic awareness tasks: initial phoneme identity, final phoneme identity, phoneme blending and phoneme segmentation. These assessments were conducted at three intervals – September, January and June – during the school year using the iPad-based assessment app discussed in Chapter Four. The initial phoneme identity and the final phoneme identity tasks were assessed at all three intervals, whereas the phoneme blending and phoneme segmentation tasks were assessed twice, in January and June, as the researcher felt that the phoneme blending and phoneme segmentation tasks were developmentally very challenging for young children to complete at the beginning of September (Carson et al., 2011; Moats, 2003). This was further supported by Carson et al.'s (2015) investigation into the validity of her computer-based assessment tool (Com-PASMA), where they found that the initial and final phoneme identity tasks were the most appropriate to assess at the beginning of the school year.

The first round of assessments, conducted in week three of September, provided baseline results for the initial and final phoneme identity tasks and took place before the introduction of the phonological awareness programme. The second round of assessments occurred after the programme was completed (January), while the third round was

conducted at the end of the school year (June), to examine whether the effects of the programme, if any, were maintained. Independent *t*-tests were conducted on the data gathered from sixty-seven children to examine whether any differences were evident in the mean scores of those children who did (experimental group) and did not (control group) receive instruction in the phonological awareness programme in their first year of formal schooling. These tests were conducted on each task to compare the mean scores between the control and experimental groups, and to identify any statistically significant differences in the mean scores of these two groups. The subsequent sections present the findings for each phonemic awareness task.

6.2.1 Initial phoneme identity task. In this task, the children were asked to identify the initial phonemes in words. The maximum score was calculated out of ten. Means and standard deviations for the scores achieved by the control and experimental groups on the initial phoneme identity task over the three assessment intervals are presented on Table 6.5 and Figure 6.2.

Initial Phoneme Identity (Out of possible 10)	Experimental Mean (SD)	Control Mean (SD)
Pre-intervention (September)	4.22 (2.16)	4.06 (2.05)
Post-intervention (January)	5.31 (2.05)	5.71 (2.34)
End of school year (June)	8.03 (1.94)	7.77 (2.01)

Table 6.5 Means and standard deviations in performance on initial phoneme (IP) identity assessment over three time intervals

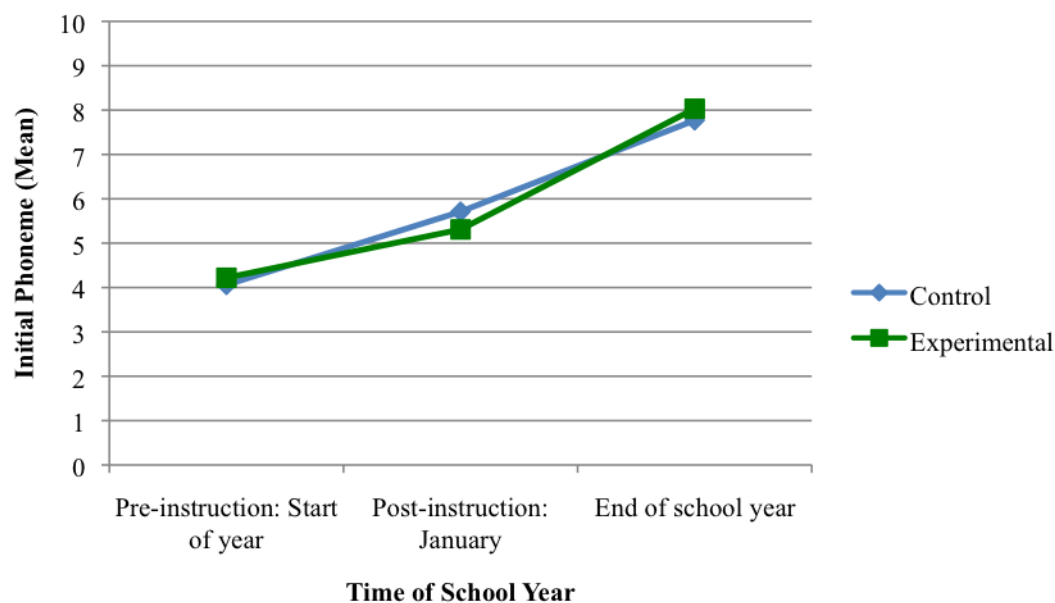


Figure 6.2 Means of performance of control and experimental groups on initial phoneme identity task over three time intervals

When independent t-test results were calculated, pre-instruction differences between the control and the experimental group showed the children's scores did not differ significantly ($t = 0.313$, $p = 0.755$). This trend continued in the post-instruction ($t = 0.743$, $p = 0.460$) and follow-up ($t = 0.594$, $p = 0.536$) assessments for both the control and experimental groups with little significant difference between the children's scores from both groups on this task at all three time intervals.

It is evident from Table 6.5 that both the control and the experimental groups made progress in their ability to identify initial phonemes in words over the course of their first year of formal schooling. The lack of difference in scores between the two groups, at all three time intervals, was regarded as unusual by the researcher, considering the experimental group received explicit instruction in this skill as part of the intervention programme. However, after an examination of the teachers' English monthly progress reports, which were submitted as part of the study, it was evident that explicit phonics instruction (through the use of the Jolly Phonics programme) was in place with the control group from early October. This highlights the importance of triangulation and gathering

data from multiple sources when conducting such studies. The Jolly Phonics programme does place some emphasis on the identification of sounds in words but quickly moves to focusing on letter-sound relationships. The experimental group did not begin instruction in identifying initial phonemes until November. Therefore, it would appear that the introduction of explicit phonics instruction with the control group did lead to improvements in the scores the children achieved on the initial phoneme identity task. The researcher was keen to see if phonics instruction would continue to influence the children's progress in the control group in the other phonemic awareness tasks.

At the end-of-year assessment, the children in the control and experimental groups were identifying, on average, the initial phonemes in eight out of a possible ten words. These were very high overall mean scores for the groups and the results indicated that many of the children were achieving almost ceiling level scores on this particular task by the end of the school year.

6.2.2 Final phoneme identity task. In this task, the children were required to identify final phonemes in words. The maximum score on this task was calculated out of ten. Means and standard deviations for the scores obtained by the control and experimental groups on the final phoneme identity task are displayed on Table 6.6 and in Figure 6.3.

Final Phoneme Identity (Out of possible 10)	Experimental Mean (SD)	Control Mean (SD)
Pre-intervention (September)	3.10 (1.64)	3.11 (1.18)
Post-intervention (January)	4.94 (1.96)	3.89 (1.76)
End of school year (June)	5.72 (2.12)	4.63 (2.27)

Table 6.6 Means and standard deviations in performance on final phoneme (FP) identity task over three time intervals

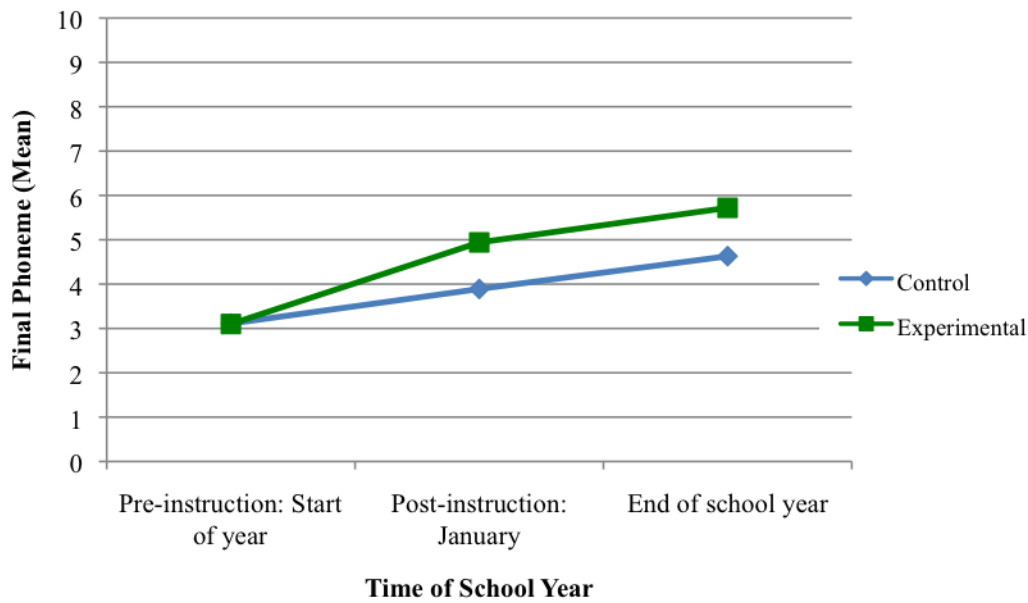


Figure 6.3 Means of performance of control and experimental groups on final phoneme identity task over three time intervals

As with the initial phoneme identity assessment, independent t-tests were conducted on the data for each group. Pre-instruction differences between the two groups showed that the children's scores in both groups did not differ significantly ($t = 0.484$, $p = 0.631$). However, directly following the phonological awareness programme (January), the children's scores in the experimental group did differ significantly ($t = 2.309$, $p = 0.024$) from the children who did not receive the implemented programme. Furthermore, the scores of the children in the experimental group continued to remain significantly different to the scores of the children in the control group in the follow-up assessment ($t = 2.019$, $p = 0.048$) at the end of the school year.

While the experimental group outperformed the control group on this task, the scores achieved by the children in both groups were noticeably lower than the scores achieved in the initial phoneme identity task. These results could reflect research by Stanovich et al. (1984), Adams (1990), and Stahl & Murray (1994), which indicates that tasks requiring children to focus on the beginning sounds in words are easier for children

to master than tasks targeting final sounds. These results, therefore, support international studies that found that the position of the phoneme(s) in words can impact upon the amount of processing skill required to complete a task (Adams, 1990; Cassady et al., 2008; Stanovich et al., 1984). Evidently, the position of the phoneme in words is an important factor to consider when developing children's phonemic awareness.

A possible interpretation of these findings is that the higher scores obtained by the experimental group on this task could be due to the explicit instruction the children received as part of the implemented phonological awareness programme. This highlights the importance of explicitly teaching challenging skills such as final phoneme identification, as the research literature emphasises that these skills can be difficult for children to acquire without explicit instruction (Adams, 1990; McBride-Chang et al., 2004; Ranweiler, 2004; Snow et al., 1998). According to the teacher's monthly progress reports, the control group did not receive explicit instruction in the identification of final sounds words until February with initial sound identification receiving the most instruction up until that point. It would appear from the findings, that the introduction of explicit phonics instruction did not aid the identification of final phonemes in words for the children in the control group.

6.2.3 Phoneme blending task. In this task, the children were presented with the following instruction, 'Here is a cake, a cap and a ring. I'm going to say one of these words very slowly. Touch the picture that you think I'm saying.' The recorded voice then said the word very slowly with a one-second break between the uttered sounds. This task, along with the phoneme segmentation task, was only assessed twice during the children's first year of formal schooling – directly after the programme and at the end of the school year. This task was scored out of a maximum of fourteen points. Means and standard deviations for the phoneme blending task are shown on Table 6.7 and Figure 6.4.

Phoneme Blending (Out of possible 14)	Experimental Mean (SD)	Control Mean (SD)
Post-intervention (January)	7.19 (2.69)	5.97 (2.78)
End of school year (June)	10.78 (3.28)	8.80 (3.32)

Table 6.7 Means and standard deviations in performance on phoneme blending task over two time intervals

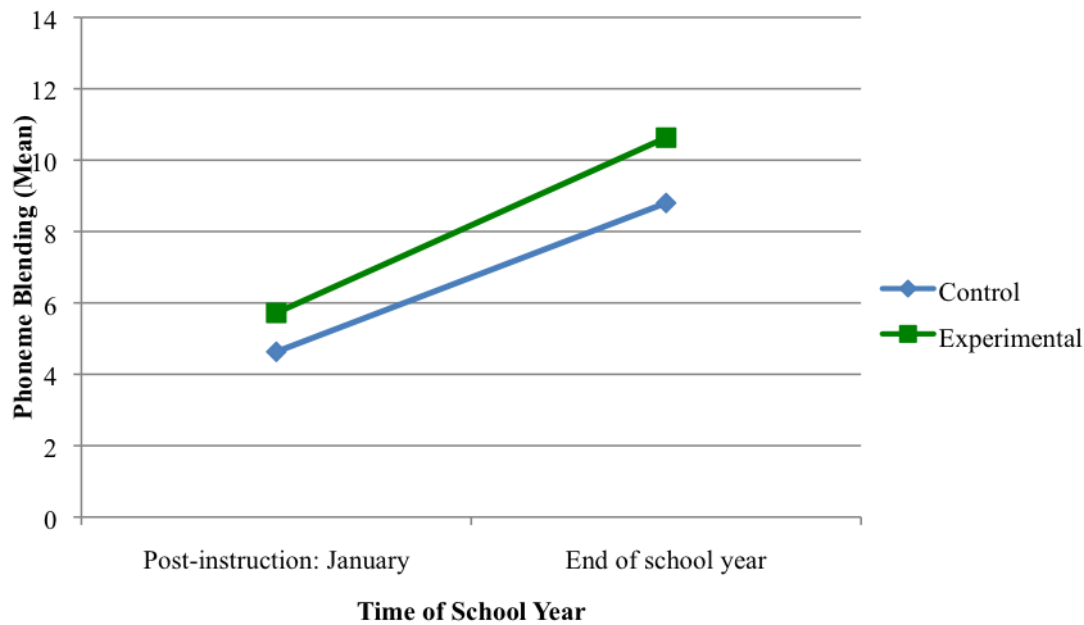


Figure 6.4 Means of performance of control and experimental groups on phoneme blending task over two time intervals

Despite the evidence of some variation in the mean scores between the control and the experimental group, the independent t-tests that were conducted indicated there was little significant statistical difference ($t = 1.815$, $p = 0.074$) between the control and experimental groups in the assessment that took place in January (directly after the experimental group had completed the implemented programme). However, in the follow-up assessment at the end of the school year, the results demonstrated a significant

difference ($t = 2.453, p = 0.017$) between the scores with the group having received the phonological awareness programme achieving higher scores than the control group.

Although the experimental group did perform slightly better than the control group directly after instruction, the results show that, as the school year continued, the children in the experimental group progressed further in their ability to blend phonemes. These findings could support the hypothesis that there is a reciprocal and bidirectional relationship between phonemic awareness and print knowledge as discussed in Chapter Two, section 2.4. Such a hypothesis suggests that improvements in children's phonemic awareness can contribute to children learning the system by which spoken words are represented in print, but, reciprocally, learning more about the letter-sound relationships in written words can deepen a child's awareness of the phonemic structure of spoken words (Ehri & Wilce, 1980; Perfetti et al., 1987). The researcher of this study would contend that children should be exposed to instruction in phoneme blending and segmentation before being introduced to print. However, once print is introduced, further improvements are made to children's phonemic awareness (particularly to higher level skills such as phoneme blending, segmentation and manipulation) as a result of developing a more in-depth understanding of the alphabetic principle.

6.2.4 Phoneme segmentation task. In this task, the children were required to look at an image and identify the number of individual phonemes in the word. They were asked to touch a box for every phoneme they heard. This is regarded as one of the most difficult phonemic awareness skills for children of this developmental age to accomplish. The maximum score was calculated out of eighteen. Means and standard deviations for the phoneme segmentation task are shown on Table 6.8 and in Figure 6.5.

Phoneme Segmentation (Out of possible 18)	Experimental Mean (SD)	Control Mean (SD)
Post-intervention (January)	6.13 (2.22)	3.09 (1.83)
End of school year (June)	9.97 (3.43)	6.17 (3.46)

Table 6.8 Means and standard deviations in performance on phoneme segmentation task over two time intervals

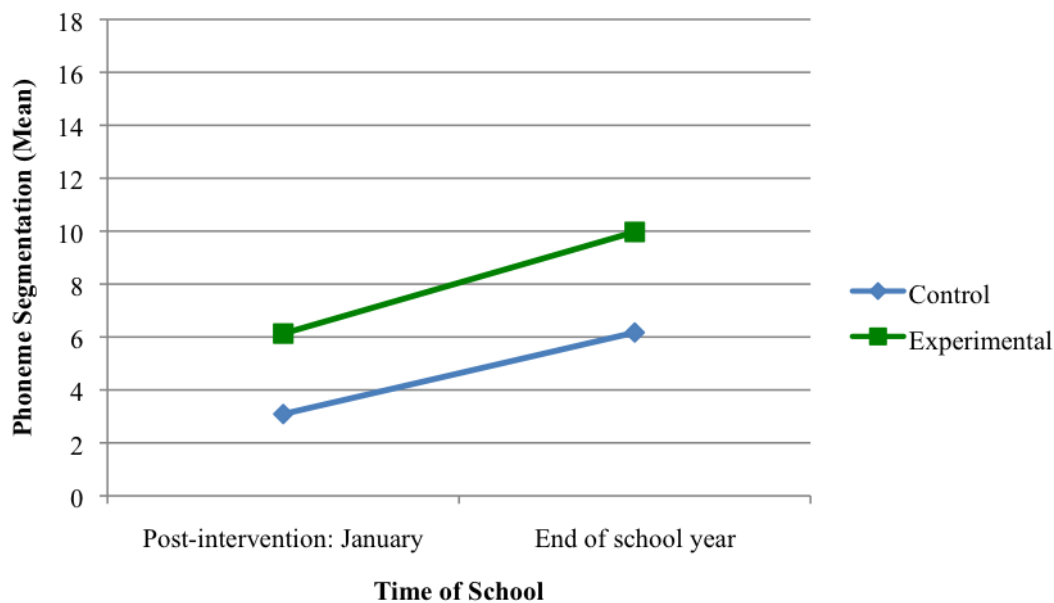


Figure 6.5 Means of performance of control and experimental groups on phoneme segmentation task over two time intervals

Calculated using independent t-tests, the results of the phoneme segmentation assessment demonstrated a statistically significant difference between the scores of the control and experimental groups directly after the implemented intervention with the experimental group outperforming the control group ($t = 6.068, p = 0.000$). The significant difference in scores continued in the follow-up assessment at the end of the school year

with the experimental group, once again, outperforming the control group ($t = 4.505$, $p = 0.000$). It is important to note that the children in the experimental group had just completed explicit instruction in phonemic segmentation prior to the assessment in January, as it was the last skill to be taught as part of the programme; therefore, this particular skill may have been fresher in the children's minds.

As with the phoneme blending task, the reciprocal and bidirectional relationship between phonemic awareness and print knowledge could have played a significant part in the improvements made by the children in the experimental group on phoneme segmentation skills as the school year continued, as they were introduced to print (directly after the phonological awareness programme was completed) through phonics instruction. The results obtained in both the phoneme blending and segmentation tasks further emphasise the importance of explicitly teaching children how to blend and segment phonemes. While the control group did receive some instruction in blending 'letters', as part of explicit phonics instruction, there was little evidence of explicit instruction in the segmentation of phonemes (or letters) in the teachers' monthly progress reports. As discussed in Chapter Two, section 2.6, these two phonemic awareness skills, in particular, make crucial contributions to future reading ability (O'Connor et al., 1995; Van Bon & Van Leeuwe, 2003; Yopp, 1988).

6.2.5 Comparison of end-of-year results on phonemic awareness tasks. Figure 6.6 presents a visual representation of the mean scores for the control and experimental groups on each phonemic awareness task at the end of the school year.

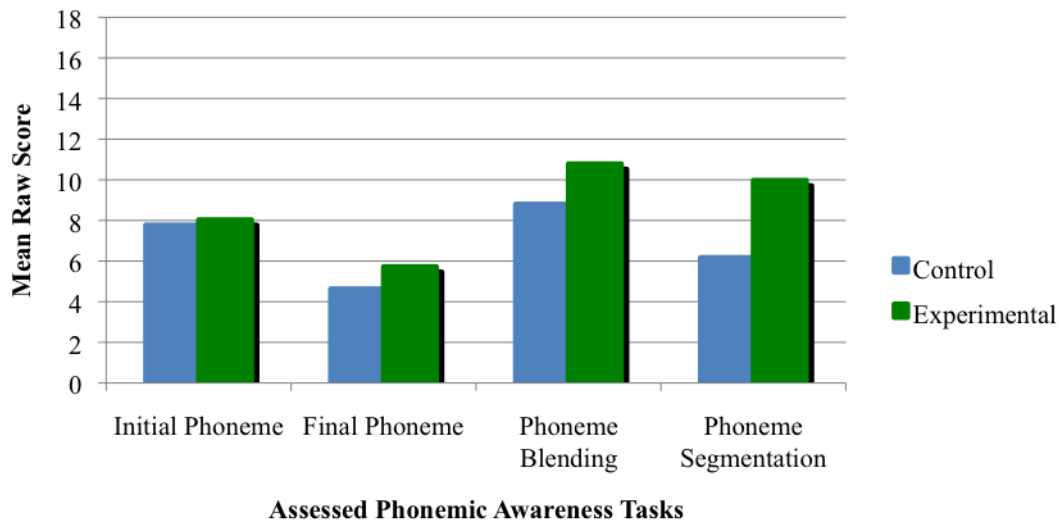


Figure 6.6 Mean performance of control and experimental groups on all tasks as per the end of the school year assessment

Figure 6.6 indicates that the experimental group who received the phonological awareness programme, focused at the crucial phoneme level, made greater improvements on three phonemic awareness skills, final phoneme identification, phoneme blending and phoneme segmentation, compared to the control group who received the ‘usual’ literacy curriculum. In particular, greater gains were achieved by the experimental group in the phoneme blending and segmentation tasks. This could be attributed to the addition of an extra week of instruction being added to each of these skills during the implementation of the programme. Therefore, these two skills received three weeks of instruction (at the request of the expert-teacher group) as opposed to the two weeks of instruction that was attributed to the other phonemic awareness skills.

Also evident from figure 6.6, are the low scores achieved by both the control and the experimental groups on the final phoneme identification task. It could be argued that, while final phoneme identification is considered a less complex task than phoneme blending, the children should have achieved higher scores in this task than the phoneme

blending task. Furthermore, as the task of phoneme segmentation is considered the most complex task included in the current research and, would have required the children to identify all of the phonemes in words (including the final phoneme), it is unusual that the children scored highly on the phoneme segmentation task and did not perform as well on the final phoneme identification task. This finding will be discussed in more detail in Chapter Seven, section 7.1.1.

6.2.6 Gain score analysis. Gain scores were calculated to measure growth in response to the implementation of the phonological awareness programme and the ‘usual’ literacy curriculum. Gain scores were calculated from the start (ie. T1) to the middle (ie. T2), as well as the middle (ie. T2) to the end (ie. T3) of the school year for the initial and final phoneme identity tasks. Gain scores from T2 to T3 were also calculated for the phoneme blending and segmentation tasks, as these were only assessed at two intervals. Table 6.9 presents the mean gain scores for both the experimental and control groups.

	Initial Phoneme Identity		Final Phoneme Identity		Phoneme Blending	Phoneme Segmentation
	T1-T2	T2-T3	T1-T2	T2-T3	T2-T3	T2-T3
Mean difference - Experimental	1.1	2.7	1.8	0.8	3.6	3.8
Mean difference - Control	1.7	2.1	0.8	0.7	2.8	3.1

Table 6.9 Mean gain scores for experimental and control groups

When examining the mean gain scores on Table 6.9, aside from the initial phoneme identification task, the results of the remaining three tasks indicate that the experimental group achieved greater gains when compared to the control group. However, it should be noted that none of the mean gain scores between the experimental and control group were statistically significant when independent t-tests were calculated.

The range of children’s scores on each task from the first round of assessments (September) to the third round of assessments (June) are presented on Table 6.10.

	Initial Phoneme Identity (0-10)		Final Phoneme Identity (0-10)		Phoneme Blending (0-14)		Phoneme Segmentation (0-18)	
	September	June	September	June	January	June	January	June
Range – Experimental	1-10	4-10	1-7	3-10	3-14	4-14	2-10	2-16
Range – Control	1-9	3-10	1-6	0-9	2-14	3-14	0-7	1-14

Table 6.10 Range of experimental and control groups scores at two time intervals

When examining the results of the range of scores for both groups, fewer children in the experimental group scored in the lower range in comparison to the control group. For example, in the final phoneme identity task, the range of scores for the control group was 0 to 9 in comparison to the experimental group, where no children scored lower than 3 test items correctly (range = 3 to 10). This was also the case at the upper end of the results, where the children in the experimental group recorded a range of scores from 2 to 16 on the phoneme segmentation task compared to the control group, which recorded a range of 1 to 14.

6.2.7 Comparison of results between DEIS and non-DEIS schools. A final comparison was drawn between the mean results of the children attending the DEIS school – both the experimental and the control group – and their peers from the non-DEIS school

assessed during Study One. In the following figures 6.7 to 6.10, the beginning- and end-of-year mean results are presented for each phonemic awareness task for all three cohorts.

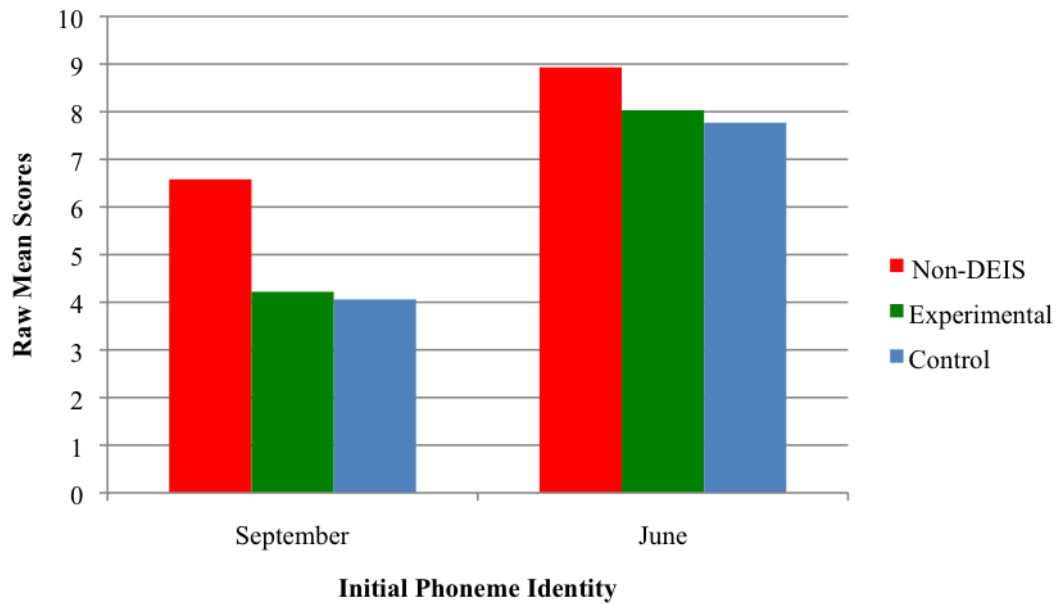


Figure 6.7 Mean performance of control and experimental groups in disadvantaged school and children from average SES school on initial phoneme identity task at beginning- and end-of-year assessment

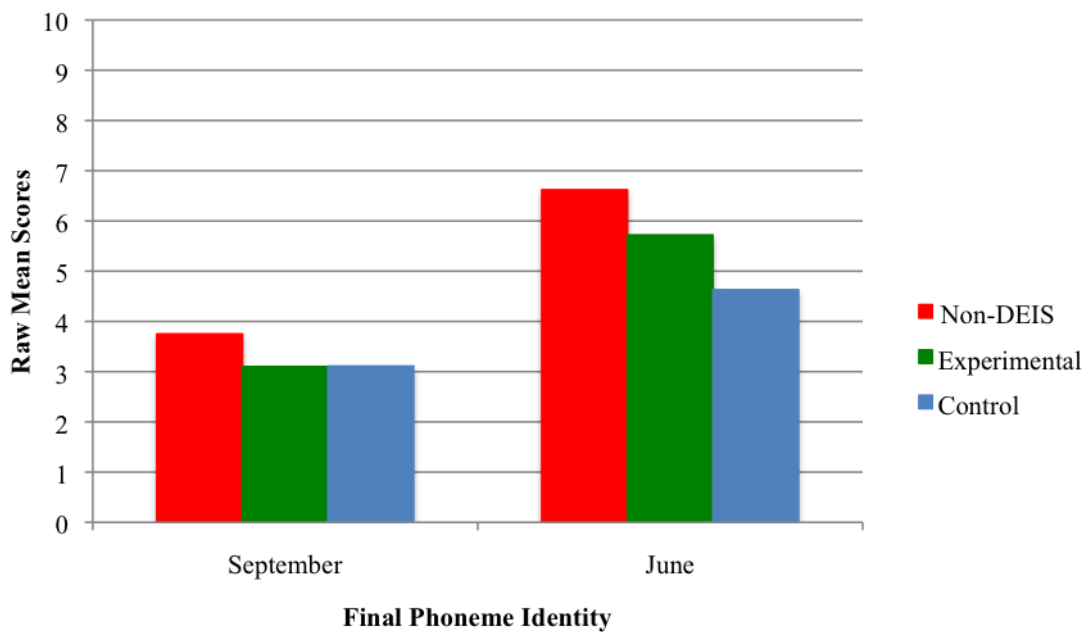


Figure 6.8 Mean performance of control and experimental groups in disadvantaged school and children from average SES school on final phoneme identity task at beginning- and end-of-year assessment

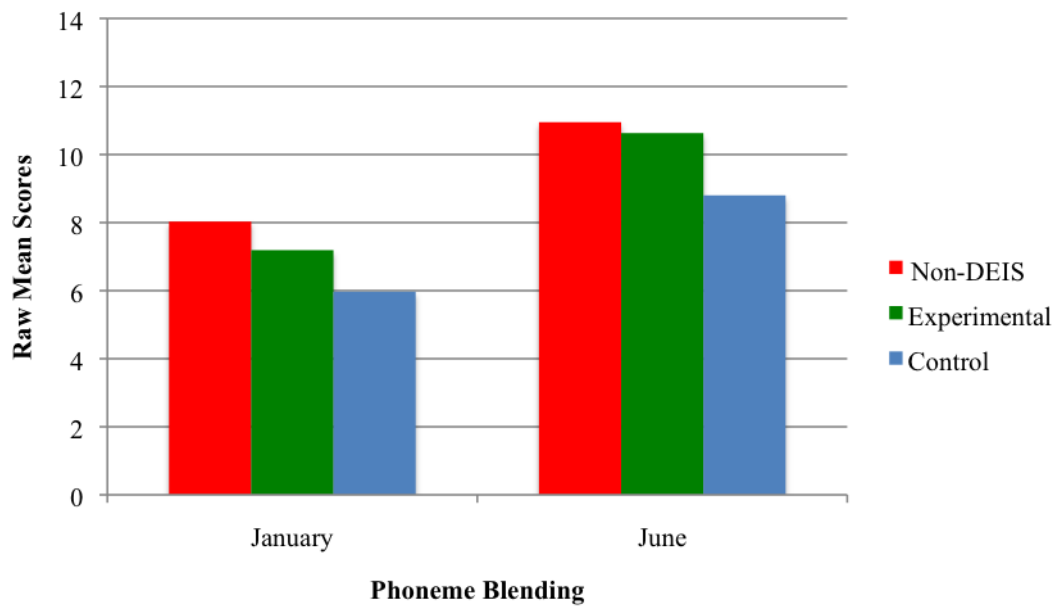


Figure 6.9 Mean performance of control and experimental groups in disadvantaged school and children from average SES school on phoneme blending task at initial and end-of-year assessment

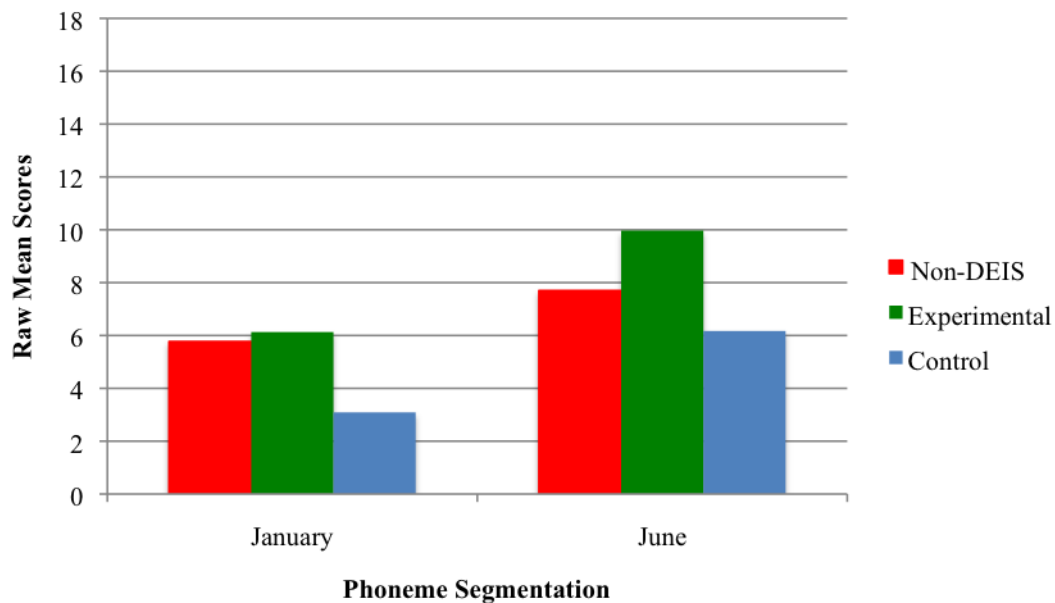


Figure 6.10 Mean performance of control and experimental groups in disadvantaged school and children from average SES school on phoneme segmentation task at initial and end-of-year assessment

While the children in all three cohorts made improvements in their phonemic awareness skills during their first year in school, the implemented phonological awareness programme does appear to have enabled the children in the experimental group to bridge the gap in the mean scores achieved by the non-DEIS children and the DEIS control-group children on the final phoneme identification task (Figure 6.8). In the case of the phoneme blending task (Figure 6.9), the experimental group performed almost on a par with the non-DEIS cohort, while it outperformed the children in the non-DEIS school on the phoneme segmentation task (Figure 6.10). These results demonstrate that the provision of an explicit and systematic phonological awareness programme, focused at the crucial phoneme level, appears to improve the phonemic awareness skills of children attending a DEIS urban Band 1 school. The researcher would contend that explicit instruction in phonemic awareness is vital, as these skills are challenging and not easy for many young children to acquire without explicit instruction. This is particularly the case for children attending DEIS schools, because it would appear from Study One that this cohort of children begin formal schooling with deficits in this crucial area, and this has the potential to impact negatively upon their later reading achievement.

6.2.8 Study Two and EDR. When examining the findings in Study Two, it was important to reflect on the methodological design of this study - educational design research – as this responsive approach to research called for constant analysis and evaluation of an implemented intervention programme. As the weeks progressed, the programme became more and more refined as a result of the analysis and feedback provided by the teachers. This could, potentially, have resulted in the implemented programme becoming more effective and more finely tuned by the time the children were receiving instruction in phoneme blending and segmentation and, consequently, could have affected the scores achieved by the children in the experimental group on these tasks. Furthermore, during the focus group interview, the teachers noted that their involvement in

the implementation, co-construction and evaluation of the programme improved their own content knowledge of phonological and phonemic awareness. They commented on the fact that the programme made more sense to them as they progressed through it and they began to see the benefits of implementing a phonological awareness programme in such an explicit and systematic manner. One teacher stated that ‘it just makes sense now to us. We understand why it’s in that order’ (T4).

While the teachers had taught aspects of phonological awareness in their junior infant classes in the past, they commented on how it was a more random approach to instruction, with one teacher saying, ‘I think everything was covered, but just not in the correct order’ (T1). It appeared that the teachers appreciated the importance of a more developmental and systematic approach to the teaching of phonological awareness. This new-found appreciation could have resulted in the teachers being more confident regarding their teaching of phonological awareness towards the end of the programme and could have contributed to the improvements made by the children in the experimental group in comparison to the control group in these two skills. Joyce and Showers (2002) contend that a substantial period of time is often required while teachers ‘bring a teaching model of medium complexity under control’ (p.2). They suggest that, on average, 8 to 10 weeks of practice is necessary to reach a competent level when teaching a new skill to children. Therefore, both the responsive nature of EDR programme implementation and its emphasis on researcher(s) and teacher(s) working in collaboration, could have contributed to the overall scores achieved by the children in the experimental group in Study Two.

6.2.9 Effect size in study two. While tests of statistical significance provide insight into whether the observed effects might have occurred by chance alone, these tests do not provide insight into whether the magnitudes of effects are substantively or practically important. The calculation of effect size can be used to measure the degree to which an instructional programme influences children’s learning. Effect size indices using

Cohen's d were calculated for statistically significant results. Cohen's d is calculated as the difference between the groups' means divided by the root mean square of the groups' standard deviations (Portney & Watkins, 2009). Conventional values for Cohen's d are small effect size $d = 0.20$, medium effect size $d = 0.50$ and large effect size $d = 0.80$ (Cohen, 1988). According to Hattie (2009), an effect size of 1.0 (eg. $d = 1.0$) can be associated with a two- to three-year improvement in pupil performance, or an improvement of 50 per cent. Therefore, a programme that yields an effect size of 1.0 suggests that children receiving this programme will perform at a higher level than 84 per cent of children who did not receive the programme. According to Hattie (2009), effect sizes over 0.4 or greater are considered desirable in educational research. Table 6.11 illustrates the effect sizes of each phonemic awareness task assessed during Study Two.

Phonemic Awareness Task	d Value	Effect Size
Initial phoneme identity	$d=0.13$	Small effect size
Final phoneme identity	$d= 0.49$	Medium effect size
Phoneme blending	$d= 0.59$	Medium effect size
Phoneme segmentation	$d= 1.10$	Large effect size

Table 6.11 Effect size values at the end of the school year

Examinations of effect-size estimates revealed that the effects were small in the initial phoneme identity task. However, the final phoneme identity and phoneme blending tasks demonstrated medium effect sizes. Finally, the phoneme segmentation task revealed large effect sizes. The variation of the effect size from task to task could possibly correlate to the methodological design of the research: educational design research. As mentioned

in Chapter Three, after each week of the programme, the resources, activities, time allocation, etc. were evaluated and changes were made collaboratively between the teachers and the researcher to maximise pupil learning. This could potentially have resulted in a more streamlined and finely tuned intervention in Week Fourteen compared to Week One, and subsequently, could have contributed to the growth in effect size from one task to the next.

The next section addresses the third research question posed in this dissertation and presents the qualitative findings that were gathered to determine the key characteristics of an effective, explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level.

6.3 Components of an Effective Phonological Awareness Programme

This section addresses the third research question of the dissertation, which seeks to determine the characteristics of an effective phonological awareness programme, implemented to positively affect junior infant children's phonemic awareness skills in a DEIS urban Band 1 school in Ireland, and acknowledges Study Two's methodological design: Educational Design Research. Proponents of EDR state that the final stage of each design research project should consist of systematic reflection and the production of design principles (Van den Akker 1999; Reeves, 2000, 2006). As outlined in Chapter Three, EDR requires that researchers who implement intervention programmes not only ask whether a programme has been successful but also to examine 'how' or 'why' it worked/did not work in order to provide insights for future researchers in the area. Due to the pragmatic nature of the research conducted in this dissertation, it was also important to establish whether the teachers felt the implemented phonological awareness programme was sustainable and whether they would continue to implement it into the future. The transcripts from the focus-group interview (see sample in Appendix L) and the teachers' logs were thematically

analysed by the researcher (see Chapter Three, section 3.10.2) and, from this analysis, one a priori theme and two emergent themes were identified. These three themes are

- programme structure and duration (a priori theme)
- catering for different abilities (emergent theme)
- transformation of practice (emergent theme)

These themes will be discussed in more detail in the subsequent sections.

6.3.1 Programme structure and duration. For ease of reporting, this theme will be discussed in two subsections beginning with programme structure and concluding with a discussion on programme duration.

6.3.1.1 Programme structure. When designing the implemented phonological awareness programme, it was important that the structure of the programme reflected the developmental progression of phonological awareness, as outlined in Chapter Two, section 2.2.3. The research literature demonstrates that phonological awareness follows a developmental progression whereby children acquire an awareness of larger units of sound, such as words and syllables, before an awareness of smaller units, such as onset and rime, and, eventually, phonemes (Adams, 1990, Anthony et al., 2002; Bryant et al., 1990; Cassady et al., 2002; Goswami & Bryant, 1990; Lonigan et al., 1998). The researcher was keen to determine whether the teachers who implemented the programme felt the content was appropriately structured for the junior infant children they were teaching.

In the focus-group interview, one of the teachers commented on the manner in which the content was presented, stating ‘in terms of the structure of the programme and doing one thing after the other, I felt it went very well’ (T2). Another teacher qualified how the structure of the content differed from her teaching of phonological awareness the previous year. She stated that, ‘the structure of the programme was really good. It started off with the very basics of sentence segmentation and word awareness ... whereas we were looking back at our plans last year and these were coming up in February. We were

thinking “what’s the point [in teaching these now], we’ve already finished Jolly Phonics and we’re only teaching sentence segmentation?” I think everything was covered [last year] but just not in order’ (T4). Another teacher commented on the support that the structure of the programme gave her in her teaching of English. She remarked, ‘it’s so nice to have a structure as well. I suppose I kind of find always with English, because there’s so much in English. I feel this is one area in junior infants that I know I’m doing this, this and this, and once I have that done I move on; so, I feel there’s loads of structure to it now with this particular area’ (T2). From these remarks, it was apparent to the researcher that the structure of the programme made a number of the teachers reevaluate the appropriate sequencing of pupil learning and this reevaluation facilitated the teachers in restructuring their own understanding of how emergent literacy learning takes place.

During the focus-group interview, remarks were also made by the teachers regarding the progression they were witnessing first-hand with regard to the children’s learning as a result of engaging with the phonological awareness programme. One teacher commented, ‘after the programme, just watching them blending and segmenting even before they had letters, I can only compare it to teaching senior infants but the difference is phenomenal’ (T4); while another teacher remarked, ‘I would have found that even in senior infants they could only give you words beginning with “s”, whereas now they’ll give you a word that has it at the end or in the middle [of the word] and they’ll tell you “it’s in the middle”’ (T1). One of the teachers who had taught junior infants the previous year (the control group) commented on how well the children in the experimental group ‘just seem to be getting it’ (T4). She also added that, ‘definitely you can see how beneficial it has been at this stage in the year comparing it to this stage last year. A big difference’ (T4). Therefore, it would appear from the teachers’ comments that the structure of the phonological awareness programme designed by researcher contributed not only to the children’s learning but also supported the teachers’ own teaching of

phonological awareness and improved their understanding of the developmental progression of phonological awareness, as well as the importance of introducing it to children in such a systematic manner.

One inadequate aspect of the structure of the programme, that arose during the implementation phase and was reported in the teachers' logs, was the challenging nature of some of the words included by the researcher when designing the programme: some words 'contained blends and made it very hard for the children to isolate initial sounds' (T4). After a conversation with the teachers, it was decided that the programme would focus on words with simple VC (vowel-consonant; eg., 'ape', 'ache', 'eye') and CVC (consonant-vowel-consonant words; eg., 'sun', 'cat', 'net', etc) sounds. Therefore, for the remainder of the programme the children worked with simple VC and CVC words only (in some instances, more challenging words could be used by the teachers with more able children). A list of these words, provided by the researcher, can be found in Appendix M. This important amendment was made in Week Eight of the study. The researcher would argue that while the structure of the programme reflected the developmental trajectory of phonological awareness, the introduction of blends occurred too early for the children involved in this study. While other phonological awareness intervention programmes (Adams et al., 1998; Carson et al., 2013), introduce blends at a similar stage to the stage implemented in this research, perhaps the deficit in the children's phonemic awareness, as identified in Study One (see Chapter Six, section 6.1), resulted in this cohort of children requiring more time to establish their phonemic awareness skills, using simple CVC words, before progressing on to more complex words containing blends. This finding was not anticipated in advance by the researcher but is an important consideration when designing phonological awareness programmes for children from lower socioeconomic backgrounds who may be starting school with more limited phonemic awareness skills. This finding also supports research by Foorman and Torgesen (2001) who found that

children ‘at-risk’ of future reading difficulties require more explicit, more intensive and more supported instruction than their more ‘typically’ developing peers.

6.3.1.2 Programme duration. The teachers in the study were asked to deliver the programme over a 14-week period from the end of September until mid-January. During the analysis and exploration phase of Study Two (see Chapter Five, section 5.2), all of the teachers commented on ‘time’ being their biggest concern in advance of implementing the programme. The teachers commented on ‘time’ concerns, such as the programme taking time away from other aspects of literacy instruction, including developing the children’s oral language, vocabulary and handwriting. Later, during the focus-group interview, one of the teachers noted that ‘it is all very beneficial, obviously, but there are other things that have to be done as well’ (T1). However, two of the teachers also acknowledged the benefits of the short-term nature of the programme and how they could turn their attention to other aspects of literacy once the programme was complete.

According to the research literature, frequent and intensive sessions are an important component of effective phonemic awareness instruction (Elbaum et al., 1999; Gillon, 2004). In the implemented programme, there was an impetus to move quickly through the broader phonological awareness skills to arrive at instruction at the phoneme level. Therefore, in the design of the implemented programme, less time was spent on the broader phonological units, such as syllabification and onset-rime, in order to spend the majority of the designated time developing phonemic awareness skills. Initially, the programme was designed as a 12-week programme; however, during the course of the implementation, the teachers felt more time was needed to develop the children’s phonemic awareness skills – particularly phoneme blending and segmentation skills. Originally, one week of instruction was given to each of the broader phonological awareness skills (eg. word awareness, syllabification, onset-rime) and two weeks were allocated to instruction in each of the phonemic awareness skills. However, feedback from

the teachers' logs resulted in an extra week being given to instruction in both phoneme blending and phoneme segmentation skills. From these findings, the researcher would contend that children attending DEIS urban Band 1 schools may need more instructional time developing phonemic awareness skills, such as phoneme blending and segmentation, than is reported in the research studies that have examined the implementation of phonological awareness interventions with cohorts of children from higher socioeconomic backgrounds.

The implementation and duration of the phonological awareness programme resulted in a significant change in practice for the class teachers from the previous year's 'usual' literacy curriculum (see Chapter Three, section 3.9.3.3). The previous year, the teachers introduced phonics instruction in October (with little attention paid to phonological and phonemic awareness development prior to its introduction); however, as a result of participating in the current research, the teachers were asked to hold off teaching phonics until the phonological awareness programme was complete (the implemented programme was completed in mid-January). The researcher was keen to provide the children with a strong basis in the identification, blending and segmentation of the sounds of language through the implemented programme before letters were introduced. As 'lack of time' featured as a significant challenge for teachers in earlier discussions, the researcher was interested to discover whether postponing the introduction of phonics instruction added to the teachers' time pressures.

The teachers all remarked that the duration of the phonological awareness programme did not impact negatively upon the introduction of phonics instruction; in fact, the teachers were surprised at how quickly the children 'picked up' the relationship between letters and sounds, especially when compared to the progress made by children the previous year (the control group). The teachers stated 'we moved much slower last year. One letter a week' (T1); 'whereas we're now doing six letters in a fortnight' (T3).

Another teacher noted that ‘even when we first started [Jolly Phonics], and it was like, “OK, does anyone know a word that has this sound?” Straight away every hand was up and they could tell you loads, whereas, last year, they would have been looking at you and it would have taken a huge amount of time to get into it’ (T1). One of the teachers informed the researcher that they now teach ‘one [letter] a day for six days and then spend four days blending and segmenting and they’re [the children] well able for it’ (T1), ‘whereas now, even with the digraphs, loads of hands are going up and telling you words that have them in it’ (T3). The teachers also commented on their ability to use a number of the activities included in the phonological awareness programme when introducing phonics instruction to the children. One teacher reported that ‘resources like the Elkonin boxes were really good because we started off using pompoms for every sound they could hear, and now we can actually use it for the letters, and it’s less work for us, ‘cause they’ve seen the boxes before, and now they just put in letters instead of the pompoms for each sound’ (T4).

It would appear, therefore, from the teachers’ comments that, while the implementation of the programme was initially met with some concern, because of the perceived time needed to complete it, in hindsight, the teachers all felt that the introduction of instruction in phonological awareness did, to some degree, speed up the introduction of phonics instruction. As reported in the research literature (Shankweiler & Fowler, 2004; Snow et al., 1998; Yopp & Yopp, 2000), phonemic awareness is crucial if phonics instruction is to be effective. Before children can use knowledge of sound-spelling relationships to decode written words, they must understand that words are made up of sounds. Without this important insight, phonics instruction often does not make sense to children. In this regard, these children can take longer to acquire phonic knowledge and, inevitably, the alphabetic principle necessary to decode printed words.

While the above theme was identified as an a priori theme, the following two themes emerged from the analysis of the quantitative data.

6.3.2 Catering for different pupil abilities. One aspect that emerged from the data was the commentary made by the teachers on the differing levels of pupil ability within their classes. It became apparent from the focus-group interview that this was a very important consideration for teachers, as the topic was raised a number of times, by all teachers, during the interview. Two of the teachers, who taught junior infants the previous year (the control group), noted ‘I was comparing them to last year. I found that this year, the middle group are finding Jolly Phonics much easier now after having that basis, whereas the middle group last year struggled a lot more with Jolly Phonics’ (T2). The other teacher remarked on how ‘the middle children are at a much higher level than my class last year’ (T4).

In relation to the children who struggled to acquire the phonemic awareness skills as readily as the other children in the class, however, one teacher commented that ‘the speed you kind of went through was great for the top group cause they were moving along with you but there were children at the lower end. Maybe if they had an extra week or two in a certain area, they would have come with you’ (T2). Another teacher noted that the less-able children were still ‘kind of struggling a little bit’ (T1). Again, the challenge of time was discussed, as one teacher commented, ‘there’s only so long you can give to it’ (T3). One teacher did suggest that ‘if certain children were going out to resource next year in senior infants, maybe they could go over them [the sounds] again’ (T4).

While the teachers agreed that whole-class teaching could be used to develop the children’s phonemic awareness skills, they all remarked that working with the children in small-group settings was more beneficial, with one of the teachers stating explicitly, ‘I do think it’s better when you have them in a small group cause, it’s the same in every class, some of them flew through it [the material], some got there in the end and some children are still really struggling with it’ (T1). Another teacher commented on the fact that it was the children who were struggling that benefitted most from working in small groups, as

they felt that they ‘lost them [the children] in whole class’ lessons (T3). The teachers felt that they could give children who were struggling more attention and individualise the instruction more in the small-group setting. One teacher remarked that ‘it was great to have the team teachers as well, and be able to do it [instruction] in a small group, and they [the children] got a lot of attention that way’ (T4).

While the researcher would have preferred the entire programme to have been delivered in small groups, there were time and timetabling restrictions that did not allow for this. The researcher would suggest that, wherever possible, the phonological awareness programme implemented in Study Two should be conducted in small-group settings of between 4 and 6 children. As team teaching (where a number of resource/learning support teachers work alongside the teacher within the classroom) is becoming a more common feature in infant classes in Ireland, and a more favourable approach to withdrawing young children from the classroom, the researcher would advocate for developing young children’s phonological and phonemic awareness skills, where possible, in a team-teaching setting.

From the above findings, it became apparent to the researcher that the implemented programme was successful in improving the phonemic awareness skills of the average and the more-able learners. While the implemented programme did include extension activities for children who were advancing well in their phonological awareness, perhaps more support could have been included to differentiate the material for those children who struggled to acquire the skills as quickly as their peers. One way to achieve this could be to offer a more differentiated, tiered approach to instruction based on assessment results. This was identified as an area for future research in Chapter Eight, section 8.3.3.

6.3.3 Transformation of practice. A further theme that emerged from the analysis of the qualitative data, was that of the transformation of practice that occurred both within the expert-teachers’ classrooms but, also, within the wider school community. As

mentioned in section 6.3.2, the introduction and implementation of the phonological awareness programme resulted in a change of practice for the expert-teacher group from the 'usual' literacy curriculum of the school. During the focus-group interview, two of the teachers remarked at how their classroom practice, and, consequently, the children's learning, differed from their previous year's teaching. These two teachers taught the previous year's junior infant cohort (the control group) and were, therefore, well placed to identify differences in their classroom practice. One teacher noted, 'we were looking back at our plans from last year and [sentence segmentation and word awareness] were coming up at this time of year (February) and we were like, "what's the point?, we've already finished Jolly Phonics and we're only teaching sentence segmentation'. So, we kind of realise now that we had it all wrong last year' (T4). Another teacher remarked 'we were looking at the plans from last year and we were like "what were we thinking?"' (T3). This teacher also noted in the previous year, the teachers went 'straight into it (phonics instruction)' and were asking the children to 'give me a word that starts with 's'?'. She remarked that the children were unsure of what they were being asked to do. This year, she noted, when phonics instruction was introduced, 'they just understood what a sound was and they understood what a word was' (T3). Therefore, not only did the teachers recognise that their classroom practice differed from their previous year's teaching but they were beginning to question why they had approached literacy instruction in the manner they did the previous year. Indeed, one teacher commented that in the previous year 'we were using parts of the Florida phonological awareness scheme but we didn't really know why we were doing it, what the benefits were. We just knew it was probably a good idea' (T4).

Interestingly, this change in practice also extended beyond the phonological awareness programme and into phonics instruction. As discussed in section 6.3.2, the teachers remarked that, in the previous year, they introduced only one letter a week in Jolly

Phonics, whereas, this year, as a result of implementing the phonological awareness programme, they were introducing ‘six letters in a fortnight’ (T4). The teachers informed the researcher that they now teach ‘one [letter] a day for six days and then spend four days blending and segmenting, and they’re [the children] well able for it’ (T1) and ‘even with the digraphs, loads of hands are going up and telling you words that have them in it’ (T3). The researcher contends that the intensive work on the identification, blending and segmentation of the sounds of language provided a strong foundation that supported the children’s knowledge of letter-sound relationships. It would appear that the teachers were able to accelerate the introduction of phonics (compared to the previous year), as a result of having developed the children’s phonological and phonemic awareness in advance. This finding supports the research literature, which argues that, as phonemes are the units of sound that are represented by the letters of an alphabet, an awareness of phonemes is key to understanding the logic of the alphabetic principle and this, consequently, aids phonics instruction (Snow et al.,1998).

Furthermore, not only was a transformation of practice occurring within the expert-group teachers’ classrooms, but knowledge of the implemented programme was also spreading amongst the school community. As a result of the expert-group teachers engaging in professional conversations with other teachers and through the implementation of the programme in a team-teaching setting, other teachers, such as the resource teachers, were also seeing the effects of the phonological awareness programme on the development of the children’s phonemic awareness skills. One teacher noted that, ‘a lot of the resource teachers are asking us to borrow the material because they have seen how effective it is in the classroom’ (T1). By the time the programme was fully implemented, the learning support and resource teachers in the school were incorporating the programme into their one-to-one or small-group sessions with senior infant and first class children who were struggling in their reading development. The most satisfying aspect of this finding was

that these professional conversations occurred quite naturally within the school. There was no onus on the expert-group teachers to have these discussions; in fact, the importance of disseminating information about the programme was never discussed or emphasised by the researcher.

An important aspect of introducing any intervention programme within a classroom setting is ensuring its sustainability and reliability. Therefore, it was important to establish whether the teachers would consider implementing the programme in future years. The teachers' responses in relation to the pragmatic nature of the programme were very positive and three of the teachers made comments such as 'going on to next year, hopefully I'll be in junior infants again and I wouldn't go back to doing it the other way. I definitely would implement it again' (T2); 'I definitely think we would continue on with it as it is' (T3); and, 'definitely you can see how beneficial it has been at this stage in the year comparing it to this stage last year. A big difference' (T1).

As a result of the school's interest in the programme, the researcher was asked to return to the school the following year to offer professional development to new junior infants teachers who were to deliver the programme. Since then, one of the teachers who delivered the original programme reported that the phonological awareness programme is still being implemented with junior infant children and the school is considering introducing a variation of it to early start children and senior infant children. The researcher will continue to work with the school in amending the programme and will provide support, if necessary, during its implementation. Furthermore, one of the expert-group teachers involved in the programme presented alongside the researcher at the Literacy Association of Ireland conference in 2018. During her presentation, the teacher highlighted how the programme worked, the benefits (as she saw them) for the children she was teaching, and how implementing the programme changed not only practice within the school but also expanded her own professional knowledge of what phonological

awareness is and its importance for emergent readers. The researcher contends that the ability of this teacher to promote the programme at a national level to other practicing teacher, highlights the growth in teacher knowledge and the change in practice that was brought about for the teachers involved in implementing, co-constructing and evaluating the programme.

Teachers are important agents of change and are often the deciding voice as to whether or not a suggested programme will be used or reused in the classroom. However, bringing about change in teacher practice can be very challenging. It has become widely recognised that preparing teachers as agents of change begins with understanding the beliefs teachers hold that drive important classroom decisions and practices (Brophy & Good; 1986; Handal & Herrington, 2003). Beliefs regarding teaching and learning are not only highly resistant to change, but they also act as a filter through which instructional judgements and decisions are made (Pajares, 1992; Cantu, 2001). The significance of changing teacher beliefs in order to bring about changes in classroom practice will be discussed in more detail in Chapter Seven, section 7.2.4.2. The next section summarises the design principles that were established as a result of the research conducted in this dissertation.

6.3.4 Design principles of the implemented phonological awareness

programme. Arising from the findings of Study Two, the researcher of this dissertation would advocate for a consideration of the following design principles when implementing a phonological awareness programme with cohorts of children from lower socioeconomic backgrounds.

- Spend more time developing children's identification of the final phoneme in spoken words. In the context of this research, the researcher would advise that an additional week be spent on this.

- Do not introduce complex words (such as those containing blends and digraphs) too early, because this adds to the complexity of the identification, blending and segmentation of phonemes for this cohort of children.
- Recognise that the implementation of the programme may take more time with children from lower socioeconomic backgrounds, as these children are often beginning instruction at a lower level than their more ‘typical’ peers. The researcher would suggest that a programme, such as the one implemented in this research, should take approximately 15 to 18 weeks.
- Include active, hands-on, engaging activities for the children and introduce activities that can be later adapted for phonics instruction; for example, the Feed the Monster activity. This reduces the time that needs to be spent introducing new activities to the children.
- Provide teachers with additional, supplementary materials to cater for the differing abilities within classrooms, and use evidence from assessments to group children according to their greatest need for the short 20 to 30 minute lessons.
- Implement phonological awareness programmes in small-groupings, such as during team-teaching or at station-teaching settings.
- Most importantly, involve teachers in implementing, co-constructing and evaluating programmes to ensure programmes are as responsive as possible to the learning needs of the children being taught. This enables teachers to feel they have ownership over the programme they are implementing. This can lead to a greater growth in, and embedding of, their content knowledge, and can also lead to changes in teachers’ beliefs as they witness, first hand, the impact of the implemented programme on their own children’s learning, which can lead to sustained changes in teacher practice and dissemination of the programme.

6.4 Chapter Summary

The findings from Study One reported that children attending a DEIS urban Band 1 school began formal schooling with a deficit in their levels of phonemic awareness in comparison to their peers attending a non-DEIS school. The findings from Study Two highlighted that the introduction of an explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, appears to have the potential to improve children's phonemic awareness skills, as the children who received explicit instruction outperformed those who did not receive such instruction on three phonemic awareness tasks: final phoneme identity, phoneme blending and phoneme segmentation. Furthermore, the children who received the phonological awareness programme continued to make improvements in their phonemic awareness skills through to the end of the school year. Importantly, the teacher data also indicated that teacher practice can be transformed through engagement in experiential learning facilitated by the EDR process.

These findings contribute to existing research literature by demonstrating that explicit phonological awareness instruction, focused at the crucial phoneme level, can improve the phonemic awareness skills of children attending schools serving areas of socioeconomic disadvantage both immediately after and up to five months post-instruction (McIntosh et al., 2007; Nicholson, 1997). The findings demonstrate that the introduction of a phonological awareness programme appears to bridge the gap between the levels of phonemic awareness of children attending a DEIS urban Band 1 school and a non-DEIS school.

Chapter Seven will present a more general discussion in light of the findings of the research conducted in this dissertation. Implications for future classroom practice, national policy, and further research will be also be discussed in Chapter Eight.

7.0 Discussion

The research conducted in this dissertation sought to make a contribution to reducing the inequality gap in reading levels that exists between DEIS urban Band 1 primary schools and non-DEIS primary schools in Ireland, as evidenced in the National Assessment of English Reading and Mathematics (2009, 2014) results. The researcher set out to achieve this by creating an explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, that was delivered to children attending a school serving an area of high socioeconomic disadvantage. The programme was implemented by teachers in their own classrooms in an attempt to improve the phonemic awareness skills of junior infant children in order to positively affect their future reading ability.

This chapter provides a discussion in light of the findings presented in Chapter Six and will be presented in three sections. The first section begins with a discussion relating to how the findings of this research compare to our knowledge of existing theories of phonemic awareness. This discussion focuses on task difficulty and the sonority of sounds, and the reciprocal relationship between phonemic awareness and print knowledge. Following this, the second section discusses literacy inequality in Ireland and, more particularly, how existing literacy gaps (NAERM, 2009, 2014) might be bridged. Issues such as shifting from a paradigm of remediation to one that focuses more on preventative solutions will be examined, along with issues pertaining to the early identification of children who fall behind in their emergent literacy development. This section concludes with a discussion on the provision of professional development for teachers and how this might best be achieved. The final section of this chapter discusses the constraints and affordances of conducting research in real-life classroom contexts. This section focuses on issues regarding the scalability of context-specific programmes, the bridging of the

research-practice divide, and, will conclude with a discussion on ethical considerations when conducting research in classroom settings. The first of these discussions, regarding theories of phonemic awareness, is presented in the next section.

7.1 Theories of Phonemic Awareness

As educational design research (EDR) aspires to contribute to theoretical understanding, the following section examines existing theoretical understandings of task complexity within phonemic awareness and identifies how the findings of the current research contributes to this understanding. This is followed by a discussion on the reciprocal and bidirectional relationship that some researchers argue exists between phonemic awareness and print knowledge.

7.1.1 Phoneme-specific task complexity and the sonority of sounds. As discussed in Chapter Two, findings from international research studies have identified hierarchical levels of task complexity within phonemic awareness skills: beginning with the identification of phonemes, advancing to blending, to segmentation, to the manipulation of phonemes within words (Cassady et al., 2008; Stanovich, 1992; Yopp, 1988). The research literature reports that tasks requiring children to identify phonemes in spoken words should be easier for children to complete than tasks requiring them to blend phonemes, which, in turn, should be easier than tasks concerned with the segmentation of phonemes. Along with task complexity, the position of target phonemes in words is also an significant factor in determining the complexity of a phonemic awareness task (Adams, 1990; Cassady et al., 2003; Stahl & Murray, 1994; Stanovich et al., 1984). The current research examined three developmentally appropriate phonemic awareness tasks: phoneme identification, phoneme blending and phoneme segmentation. The phoneme identification task comprised of two subtasks. In the first instance, children were asked to identify the initial sounds in words, while the second task required them to identify the final sounds in words. Within these subtasks, identifying initial sounds in words is considered a less

complex task than identifying the final sounds (Adams, 1990; Cassady et al., 2008; Stahl & Murray, 1994).

While some of the findings of the current research study supports the research literature, such as the recognition that identifying initial phonemes in words is the least complex of the phonemic awareness tasks and phoneme segmentation is the most complex (of the tasks included in the current research), some findings are also at odds. The current study found that tasks requiring children to identify the initial phoneme in words and to blend phonemes were easier tasks for the children to succeed in than tasks requiring the children to identify the final phonemes in words (see Chapter Six, section 6.2.2). This finding goes against the research literature, which reports that a task requiring children to identify phonemes (either initial and final) in a word should be a less complex task than blending phonemes. However, as evidenced in the lower mean scores (see Table 7.1) achieved by the experimental group in the final phoneme identity task, it would appear that the identification of the final phoneme in words proved a challenge for children in this study. Furthermore, the final phoneme identification task achieved the lowest gain scores out of the four assessed tasks.

	Initial Phoneme Identity (10)	Final Phoneme Identity (10)	Phoneme Blending (14)	Phoneme Segmentation (18)
Mean score	8.03 (1.94)	5.72 (2.12)	10.63 (2.98)	9.97 (3.43)

Table 7.1 End-of-year mean scores achieved in each phonemic awareness task

The fact that children found it difficult to identify the final phonemes in words could also have had a direct affect on their ability to segment phonemes in words (a task that requires children to identify all of the phonemes in a spoken word, including the final phoneme). The researcher was keen to determine why the findings from this study deviated from other similar studies, and the research literature in general. A search for studies focusing particularly on findings related to the identification of the final phonemes

of words did not offer much insight on the topic; in fact, few studies were identified in the research literature. However, the researcher did come across a study conducted by Treiman and Weatherston (1992), which reported that the properties of words can strongly affect segmentation performance in particular. Treiman and Weatherston reported that words are made up of syllables, with a syllable further broken down into an onset and a rime. The onset represents the initial consonant or consonant cluster, while the rime consists of the vowel and the remainder of the syllable. For example, in the word 'bag', the onset is /b/ and the rime is /ag/. However, the rime of a word can be further broken down into the vowel and – what is referred to as – the coda (Treiman & Danis, 1988). Treiman and Weatherston (1992) contended that it is more difficult for children to segment the final sound (or coda) in the word 'hat', (as opposed to identifying the initial sound in the word), as the /t/ is part of the rime /at/ and its sound is heavily influenced by the preceding vowel within the rime.

The children in the current study were required to identify the final phoneme in words, and, segment a range of monosyllabic words that consisted of CVC, CCVC, CVCC word properties. Consequently, segmentation and identification of the final sound within the coda could have posed a challenge for children because these words contained blends and, in some cases, digraphs, which the children could have found difficult to segment and identify. Furthermore, the cohesion of phonemes is also determined by the sonority (ie. the relative loudness of a speech sound due to the openness of the vocal tract) of the consonants. Treiman (1984) suggested that liquids (eg. /l/ or /r/) tend to adhere more closely to the vowel than nasals (eg. /m/, /n/, /ng/), which in turn adhere more closely to the vowel than obstruents (eg. plosives /p/ or /d/ and fricatives /s/ or /f/). Schreuder and Van Bon (1989) also reported that consonant clusters (eg. consonant blends and digraphs such as 'cl', 'sh' or 'br') in the coda are more difficult to segment than vowel-consonant combinations. Upon the close examination of the ten monosyllabic words the children were expected to

identify the final phonemes of in Study Two (see Chapter Four, section 4.9.2.4), the researcher identified five of the words as ending in obstruents (which would have been the easiest for the children to identify), one word ended in a nasal sound, and four of the words ended in consonant clusters. According to Schreuder and Van Bon (1989), these would have been the most difficult endings to determine. The five words ending in obstruents could, potentially, have resulted in the experimental children achieving the mean score of 5.72 in the final round of assessments, as they may have found identifying the final sound in the words ending in the nasal sound and consonant clusters challenging. Furthermore, Hickey (2009) contends that the weakening of the /t/ is a particular phonological phenomenon of Irish English. As one of the target words, 'hat', ended in /t/ in the final phoneme identity task, this too could have been considered a challenge for the children. Overall, the sonority of consonants and the weakening of particular consonants in Irish English, are aspects of the current research that requires further examination to determine, conclusively, whether they are contributing factors in the task complexity of phonemic awareness skills, and to determine whether they could have resulted in the lower scores achieved by the children in the final phoneme identity task.

As the identification of final phonemes in words is paramount to provide children with a foundation for the development of crucial segmentation skills, the researcher would argue that appropriate time be spent on explicit instruction in identifying the final phonemes in words. In the context of the programme implemented in this research, three weeks could be attributed to instruction in final phoneme identification considering the challenging nature of this task.

7.1.2 Reciprocal relationship between phonemic awareness and print

knowledge. As discussed in Chapter Two, section 2.4, research has demonstrated that a reciprocal relationship exists between phonemic awareness and print knowledge; however, there is a long-standing debate as to whether phonemic awareness should be considered a

prerequisite to, or a consequence of, the introduction to print. While some studies support the notion that phonemic awareness is a consequence of exposure to print and formal reading instruction (Bowey & Francis, 1991; Read et al., 1986; Morais, 1991), there is also evidence to suggest that some level of phonemic awareness is required as a prerequisite to the introduction of print (Ball & Blachman, 1991; Bryant et al., 1990; Byrne & Fielding-Barnsley, 1991, 1993, 1995, 2000; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Juel et al., 1986; Lonigan, 2003; Storch & Whitehurst, 2002; Torgesen et al., 1994).

The findings in the current study support the hypothesis that a reciprocal and bidirectional relationship exists between phonemic awareness and print knowledge. From the findings of the phoneme blending and segmentation tasks in Study Two (see Chapter Six, sections 6.2.3 and 6.2.4), the researcher would argue that some phonemic awareness skills promote reading development and these skills should be considered a precursor to the introduction of print (Torgesen, 2002). The introduction of skills such as phoneme blending and phoneme segmentation, in particular, are important to develop prior to introducing print as a child needs an opportunity to blend and segment the sounds of their spoken language before letters are mapped onto these sounds.

The expert-teacher group who implemented the phonological awareness programme also found that completing work in blending and segmenting at the phoneme level enabled children to perform similar tasks at a quicker pace when letters were introduced (see Chapter Six, section 6.3.2). They commented on the children having a better understanding of what was required of them when blending and segmenting letters in a simple CVC word, compared to the previous year's control group, as they had accomplished these skills first using the sounds of their spoken language. Therefore, the researcher of the current study contends that it is important that children are exposed to phonemic awareness skills, especially phoneme blending and segmentation skills, prior to

being introduced to print. Children who demonstrate a mastery of these skills are signaling that they are ready to be introduced to letters. Figure 7.1 represents the point at which the researcher would contend phonics instruction should be introduced.

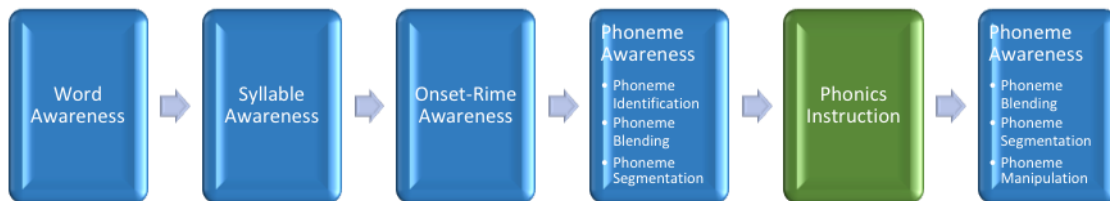


Figure 7.1 The introduction of phonics instruction during the phonological awareness continuum (O'Sullivan, 2018)

The large mean gain scores achieved by the experimental group between the second and third assessment phases, in both the phoneme blending and phoneme segmentation tasks (see Chapter Six, section 6.2.6, table 6.9), supports those who argue a reciprocal relationship exists, as the children's blending and segmentation skills continued to improve and develop even after the completion of the phonological awareness programme and as letters were introduced. Ehri and Wilce (1980) argue that due to the permanent nature of letters (as opposed to the abstract nature of sounds), once introduced, children's knowledge of print further develops and this deepens the more complex phonemic awareness skills such as phoneme segmentation and manipulation. Therefore, the current research supports those who argue that an awareness of phonemes contributes to learning the system by which spoken sounds are spelled in print, and, reciprocally, exposure to print further deepens a child's more complex phonemic awareness skills.

7.2 Bridging the Reading Inequality Gap

This section discusses how the introduction of an explicit and systematic, teacher-led phonological awareness programme, such as the one implemented in this research, has the potential to bridge the gap in reading ability, that currently exists between children

attending DEIS and non-DEIS schools in Ireland, before formal reading has even begun. As seen in the NAERM (2009, 2014), children in second and sixth classes in DEIS schools demonstrate lower levels of reading ability than their peers in non-DEIS schools. This researcher would argue that the introduction of a phonological awareness programme, focused at the crucial phoneme level, in junior infants could potentially reduce the gap in the reading ability of children in the later classes, as phonemic awareness is considered an essential precursor to and predictor of later reading achievement. Therefore, the premise here is that if we can provide children in DEIS schools with explicit instruction in phonemic awareness, we are providing them with crucial foundational skills upon which they can build their future reading. This, in turn, could potentially reduce the gap in reading ability, as these children move through the school. For this to happen, the researcher would argue that four areas need to be targeted in an attempt to reduce literacy inequality in primary schools. These include:

- a paradigm shift from the remediation of reading difficulties to the prevention of reading difficulties
- accurately identifying children who fall behind in early reading
- the introduction of more explicit, intensive and supportive early reading instruction for children attending DEIS urban Band 1 schools
- the provision of professional development and support for teachers in the area of emergent and early reading skills.

Each of these areas will be discussed in more detail in the subsequent sections.

7.2.1 Prevention versus remediation. The importance of providing preventative approaches to reading difficulties is documented in a number of research studies (Snow et al., 1998; Torgesen, 2002; Vellutino, Scanlon, Sipay, Small, Pratt, Chen, & Denckla, 1996). In an Irish context, a range of policy documents and papers have recommended more preventative approaches to reading difficulties. In 2001, the Irish National Teachers'

Organisation's (INTO) report *Literacy in the Primary School* stated that 'there is agreement that a preventative approach to reading difficulties is the most effective one' (p.39). *The Guidelines on Remedial Education* (DES, 1988) stated that 'a good remedial programme should be a preventive one' (p. 35), and the *Learning Support Guidelines* (DES, 2000) for primary schools advised that schools 'implement intensive prevention programmes' (p. 15) from junior infants to second class. In its report, *Better Literacy and Numeracy for Children and Young People* (DES, 2010), the Department of Education and Skills recommended, as one of its actions, that schools should 'implement intervention strategies in the second term in junior infants for those students identified as having difficulty, especially in the areas of oral language and phonemic awareness' (p. 28). Echoing the thoughts of the researcher, the *Literacy and Numeracy for Learning and Life* strategy (DES, 2011) states that 'at present, Department of Education and Skills policy focuses such intervention at the senior infant's stage. However, offering intervention only at this stage may be too late for many children, particularly when it is shown that learning problems stem from difficulties associated with oral language development' (p. 49). While there is clear recognition of the need to introduce more preventive reading measures in early years' classrooms, to date, no mandated prevention programmes have been implemented by the government. It is also clear that literacy interventions focusing on remediation currently in place in DEIS urban Band 1 schools, have not been successful enough in closing the reading ability gap between children attending these schools and children attending non-DEIS schools in Ireland.

The researcher of this dissertation would argue that we need to target children's emergent literacy skills, such as phonological and phonemic awareness, and support these skills through explicit, intensive and supportive instruction in order to prevent, rather than remediate for future reading difficulties. This is particularly the case for children who may present as 'at-risk' for future reading difficulties. The importance of the prevention of

reading difficulties has been highlighted in several longitudinal studies in the United States, which have demonstrated that children who are poor readers at the end of first grade almost never acquire average-level reading skills by the end of elementary school (Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher, 1996; Juel, 1988; Torgesen & Burgess, 1998). Preventative interventions are not only more cost-effective in the long run – as many later interventions that focus on remediation of reading difficulties may no longer be required - but, more importantly, they also improve children’s motivation to read, as children experience a more positive introduction to reading and, consequently, regard themselves as successful readers from a young age. The cost of remediating reading difficulties is high for the child, as delayed reading skills can affect vocabulary growth (Cunningham & Stanovich, 1998), motivation to read (Oka & Paris, 1986), and can lead to missed opportunities in terms of the development of comprehension strategies (Brown, Palincsar, & Purcell, 1986). Yet, few, if any, preventative interventions that target children’s emergent literacy skills have been mandated in disadvantaged schools (or indeed in mainstream schools) in Ireland.

Research on emergent reading has grounded our understanding regarding how children learn to read. In the past, the ‘reading readiness’ approach meant that reading difficulties often were not in evidence until the young child had begun formal reading. Consequently, remediation for reading difficulties had to wait until the child began to read. We now know that literacy learning develops from birth, and we are in a position to provide preventative measures to children who may experience reading difficulties before they have begun to read formally. One phonological skill that acts as an important precursor to and predictor of future reading ability is phonemic awareness (Ehri et al., 2001; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002). Given the predictive nature of phonemic awareness, one might question why interventions in this crucial area

are not more prevalent in Ireland, in particular, amongst children attending schools serving areas of socioeconomic disadvantage.

This researcher contends that the introduction of a research-based explicit and systematic, teacher-led phonological awareness programme, to junior infants attending DEIS urban Band 1 schools, is long overdue. Furthermore, the introduction of a programme, such as the one implemented in this research, could mean that children who are traditionally likely candidates for Reading Recovery (Clay, 1993) may no longer require such support during their second year of school. This, in turn, reduces demands on resources in schools and allows those children who are most in need of supplementary support to receive it. However, such an approach requires a paradigm shift from one that focuses on remediation or ‘recovery’ of reading difficulties to one that focuses on the prevention of reading difficulties in the first instance. In light of this discussion, the researcher asserts that the programme implemented in this dissertation be referred to as an explicit, teacher-led phonological awareness ‘prevention’ programme.

7.2.2 Identifying children who fall behind in reading growth. Given the importance of phonemic awareness as a predictor of future reading difficulties, assessment tools that measure and monitor children’s phonemic awareness skills are essential to teaching and learning. While researching the range of assessment tools currently available to classroom teachers for assessing children’s phonemic awareness, the researcher found that there were two significant shortcomings to already-available assessments. These identified shortcomings included the fact that

- Few of the available assessments comprehensively assessed children’s phonological awareness at the crucial phoneme level
- Many of the traditional paper-based assessment tools available for classroom use were very time-consuming to administer, with many requiring children to be assessed on a one-to-one basis.

The worrying outcome of these shortcomings is that they could result in teachers deciding not to administer these assessments because they simply cannot find the time to do so (McLeod et al., 2003). Furthermore, the researcher would argue that while a number of the already-available phonological awareness assessment tools may be measuring children's broader phonological awareness skill, these tools do not adequately and comprehensively assess children's awareness at the crucial phoneme level, which has been proven to have the most direct impact on future reading ability (Ball & Blachman, 1991; Bryant et al., 1990; Byrne & Fielding-Barnsley, 1991, 1993, 1995; Carroll & Snowling, 2004; Carson et al., 2013; Cunningham, 1990; Ehri et al., 2001; Gillon, 2004; Lonigan, 2003; Storch & Whitehurst, 2002; Torgesen et al., 1994). Therefore, reducing the time inefficiency of phonemic awareness assessments is an important key for ensuring that teachers can easily and efficiently monitor children in order to provide more differentiated instruction and to identify children who may be at risk of future reading difficulties. Consequently, an iPad-based phonemic awareness assessment app was created by the researcher and implemented in both Study One and Study Two in order to examine whether such a measurement tool could provide a more time efficient manner in which to assess children's phonemic awareness skills.

The iPad-based phonemic awareness assessment app included four phonemic awareness tasks: initial phoneme identity, final phoneme identity, phoneme blending and phoneme segmentation. Firstly, with regards to time efficiency, the iPad-based assessment app allowed for the quick preparation and set up of the assessment. Secondly, the administration of the assessment itself allowed for much quicker implementation. Not only did the children self-administer the assessment but the assessment could also be completed with groups of children instead of on a one-to-one basis. In fact, the iPad-based assessment app could potentially be administered to an entire class in one sitting; however, more research would need to be conducted to evaluate whether this is achievable.

Thirdly, the iPad-based assessment app reduced the need for teachers to record and score children's results, as these results were automatically recorded and stored on a database for later interpretation. This automatic scoring of results frees the classroom teacher from a substantial body of work (Bjornsson, 2008; Martin, 2008; Ripley, 2008; Singleton et al, 1999).

One further advantage of using a tool such as the iPad-based phonemic awareness assessment app is that every child completing the assessment hears the same recorded voice throughout. This was an important consideration for the purposes of this research. As phonemic awareness requires children to listen for the sounds of spoken language, even the slightest change in dialect or accent can affect children's performance. Therefore, the iPad-based tool allowed for a consistent voice/dialect/accents to be heard by all children during each assessment period. In the future, class teachers could potentially record their own voice onto the app before administering it to the children in his/her class; however, further investigation of this possible modification is required.

Overall, the time-efficient iPad-based phonemic awareness assessment app implemented in this research study contributes to the variety of measurement tools available to assess young children's phonemic awareness skills. The iPad-based app could enable teachers to measure children's phonemic awareness skills in a time-efficient manner at least three times over the course of their first year of school and allow children at risk of future reading difficulties to be identified as early as possible. This, in turn, would afford teachers the opportunity to provide early intervention without having to wait until formal reading has begun. This provides a strong rationale for further investigation into the use of computer-based assessment tools, such as the iPad, for assessing and monitoring the phonemic awareness development of children in their first year of formal schooling.

Findings from the NCCA Primary Curriculum Review Report (NCCA, 2005) and the Department of Education Inspectorate Report (DES, 2005) identified a number of

barriers to teachers adopting regular assessment and monitoring of children's progress in an Irish context. These barriers included a lack of time to conduct such assessment, a lack of adequate assessment tools, and a proposed increase in teacher competency in assessing children's progress in literacy. It is hoped that the assessment method implemented in this research could potentially reduce at least two of these barriers to assessment by providing Irish teachers with a new, time-efficient assessment tool to measure and monitor children's phonemic awareness skills.

7.2.3 Providing more explicit, more intensive and more supportive instruction in phonemic awareness in DEIS schools. The findings of Study Two support the research literature that posits that more explicit, more intensive and more supportive instruction is required to improve 'at risk' readers' emergent literacy skills (Foorman & Torgesen, 2001). While many children enter school with competent phonological awareness skills, studies have shown that children entering school from lower socioeconomic backgrounds often exhibit lower levels of phonemic awareness, as a result of their limited interaction with print and their limited exposure to rich language experiences in the home (Burt et al., 1999; Dodd & Carr, 2003; Gillon et al., 2007; Hecht et al., 2000; Locke et al., 2002; Lonigan, 2003; McIntosh et al., 2007; Torgesen et al., 1994; Whitehurst, 1997). Study One of this current research, and national assessments of reading (Shiel et al., 2014) support these findings.

The phonological awareness programme implemented in this dissertation ensured that these three crucial features of instruction were provided for the junior infant children attending the DEIS urban Band 1 school. The programme was delivered in a systematic manner in order for the children to build slowly and progressively on previously learned phonological awareness skills. The structure of the programme ensured that children were exposed to larger units of sound before being introduced to the individual sounds of language known as 'phonemes'. The programme was also delivered in an intensive, small-

group settings three times a week. These small groups allowed for more individualised, intensive and supportive instruction for the children. The use of the Gradual Release of Responsibility model (Pearson & Gallagher, 1983) supported the explicit modelling of any new learning by the class teacher. This model scaffolds children's learning and demands that the cognitive work required to learn a new skill shift slowly and intentionally from teacher modeling, to joint responsibility between teachers and children, to, ultimately, independent practice and application by the learner.

In conclusion, Moats (1999) argues that 'although some children will learn to read in spite of incidental teaching, others never learn unless they are taught in an organised, systematic, efficient way by a knowledgeable teacher using a well-designed instructional approach' (p. 7). The research conducted in Study Two demonstrates that explicit, intensive and supportive instruction, focused at the crucial phoneme-level, should be considered a critical component of beginning classroom reading programmes especially in designated-disadvantaged schools.

7.2.4 Professional development and support for teachers. Although there is a consensus that explicit phonemic awareness instruction is highly beneficial for emergent readers (Ehri et al., 2001; Lonigan, 2003; Snow et al., 1998; Storch & Whitehurst, 2002), this kind of instruction demands a high level of teacher knowledge and skill (Moats, 1994). Unfortunately, research has found that the concept of phonemic awareness is not well understood by many classroom teachers. Furthermore, there is evidence that phonemic awareness is often not well integrated into classroom reading programmes and instruction is often haphazard or, in some cases, not evident at all (Cunningham, Perry, Stanovich, & Stanovich, 2004; Cheesman, McGuire, Shankweiler, & Coyne, 2009; Moats, 1994; McCutchen, Abbott, Green, Beretvas, Cox, Potter, et al., 2002). The findings from the above researchers, and from other research studies (Bos et al., 2001; Brady & Moats, 1997; Dickinson & Brady, 2005; Moats & Foorman, 2003; Phillips et al., 2007; Zill &

Resnick, 2006), suggests that a large number of teachers have a limited understanding of what phonemic awareness is, are unsure why it is a crucial precursor to conventional reading, and do not know how to promote its effective instruction in the classroom. Consequently, the importance of upskilling teachers' content knowledge in the area of phonemic awareness is paramount if children are to be provided with effective instruction in this crucial emergent literacy skill.

The mere upskilling of teachers' content knowledge, however, may not be enough to bring about real change to classroom practice. Findings from the thematic analysis of the focus-group interview transcripts (see Chapter Six, section 6.3.5) suggested that, in the context of this research, two factors affected the teachers and the wider school community's sustained changes in classroom practice: (1) an improvement in teachers' content knowledge of phonological and phonemic awareness, and (2) the shift in their belief of the importance of developing emergent readers' phonological and phonemic awareness. These two factors are discussed in more detail in the following subsections.

7.2.4.1 Improving teachers' content knowledge. During the initial meeting, the teachers' comments on their own knowledge of phonological awareness echoed the research literature, which found that it is an area that is not well understood by many classroom teachers (Bos et al., 2001; Brady & Moats, 1997; Dickinson & Brady, 2005; Moats & Foorman, 2003; Phillips et al., 2007; Zill & Resnick, 2006). One teacher remarked, 'at the start when we first met, you gave us words like "phonological awareness" and "phonemic awareness" but none of us really knew what phonemic awareness meant. And "phonological awareness", we kind of knew it was something to do with sound and rhymes and syllabification' (T2); 'We were using part of the Florida phonological awareness scheme but we didn't really know why we were doing it, what the benefits were. We just thought it was probably a good idea' (T4). However, by the end of the programme, the teachers commented on the fact that 'it just makes sense now to us'

(T1) and they were able to understand ‘why it’s [the structure of the programme] in that order’ (T3). The researcher would argue that while growth in the teachers’ content knowledge, facilitated by the researcher through two pre-implementation professional development sessions, was vital in order for the teachers to have the necessary knowledge to deliver the programme, it was the implementation, constant reflection, and the professional conversations regarding the programme that the teachers were engaged in, that embedded the teachers’ newly-acquired knowledge into their classroom instruction over the period of five months.

7.2.4.2 Changing teacher beliefs. While the teachers’ newly acquired knowledge allowed them to understand the development of phonological awareness skills and how such skills could be taught in the classroom, the researcher contends that it was the process of implementing, co-constructing and evaluating the programme over an extended period that, ultimately, led to sustained changes in instructional practices within the school.

It could be argued that the change in the teachers’ beliefs regarding the importance of developing children’s phonological and phonemic awareness was facilitated and reinforced through the experiential learning that the process of implementing, co-constructing and evaluating the programme afforded the teachers. For example, the teachers’ initial fears regarding ‘time’ for the implementation of the programme could potentially have stemmed from a lack of belief that phonological awareness was important; however, through their active engagement with the programme, the teachers’ beliefs appeared to change, as all of the teachers acknowledged that they were happy and keen to implement the programme in their future teaching. This apparent change in belief was also evident in the dissemination of the programme to the wider school community. This dissemination was very much driven by the expert-group teachers as the researcher made no suggestions regarding the dissemination of the programme at any stage. By engaging in experiential learning, the researcher would argue that the teachers could see the benefits of

the programme first hand and, in two cases, teachers could see a difference in learning with regard the previous year group who did not receive the programme (see Chapter Six, section 6.3.1). The teachers use of language such as ‘phenomenal’, ‘a big difference’ and ‘they’re flying through it’ is evidence of the impact they believed the programme had on the children’s learning.

Experiential learning is defined as the type of education whereby knowledge and meaning are contextualised in actual experience (Perry, 2011), and is rooted in the work of Dewey, Piaget and Vygotsky. Experiential learning requires learners to focus on a lived experience upon which they can reflect, think and act. Dewey (1933) argued that not all experience results in learning, as true experiential learning is a process of change within an individual, and such learning can bring about a sustained change in teacher beliefs. The researcher would argue further that the engagement in experiential learning and the first-hand experience of implementing the programme and seeing children benefit from such instruction led to what is referred to in the literature as ‘transformational learning’.

Transformational learning occurs when individuals gain an awareness of their current habits of mind and points of view, and assess alternative views and decide to renounce an old view in favour of a new one (Mezirow, 1997). Evidence of transformational learning was noted when all of the teachers stated that they would continue to implement the programme into the future. One teacher remarked that she ‘wouldn’t go back to doing it the other way’ (T3), demonstrating the renunciation of the old way of doing things in favour of the new.

The researcher would argue that the adoption of educational design research as a methodological approach significantly contributed to the experiential learning that the teachers engaged in. The three phases of EDR, its strong emphasis on research being situated in real educational contexts, and the importance of collaboration, allowed for growth in the teachers’ content knowledge of phonemic awareness but also afforded them

the opportunity to experience first-hand the impact of an explicit, teacher-led phonological awareness programme, focused at the crucial phoneme level, on the children's learning. The researcher would question whether the sustained changes in instructional practice, evident both in the junior infant classrooms and in the wider school setting, would have come about had the teachers been given a programme they had no voice in constructing or evaluating, or if they had merely been told about the potential of instruction in phonemic awareness skills through a series of seminars.

From the findings of Study Two presented in Chapter Six (section 6.2), it appears that the process of engaging in EDR, which promoted experiential learning, had a transformative effect on the expert-group teachers' content knowledge and their beliefs regarding the importance of instruction in phonological and phonemic awareness skills, which, in turn, affected future instructional practices and, ensured the sustainability and the dissemination of the programme within the wider school community.

7.3 Conducting Research in a Classroom Context

Conducting research in educational settings can be challenging. Classrooms are multidimensional (Doyle, 1986), in that they consist of people with differing abilities, personalities, skill sets, and differing individual inclinations towards teaching and learning. Essentially, a classroom is an unpredictable environment in constant flux. Teaching and learning can be interrupted at any time by questions, messages at the door, fire alarms, malfunctioning equipment, the need to attend to classroom and behaviour management issues, etc. All of this can, and does, pose problems for research conducted in real-life contexts.

Imposing rigour on research conducted in a classroom setting presented a number of challenges for the researcher. The restriction in the allocation of participants to randomised groups, and the difficulty of controlling the many variables that exist within a classroom environment – while all the time attempting to protect the integrity of the

implementation of the programme – all posed challenges. However, the adoption of a pragmatic methodological approach – educational design research – provided a richness of its own that, in the researcher’s opinion, outweighed the loss of laboratory-based research rigour. For example, the responsive nature of EDR ensured that the phonological awareness programme was adapted and shaped to suit the learning needs of children within the real-life context of the classroom. Furthermore, rather than trying to control the many variables that exist in such a setting, EDR recognises and adapts to these variables, strengthening the external and ecological validity of the research. The researcher would contend that the involvement of the teachers as collaborators and co-constructors of the programme may also have led to the sustainability and dissemination of the programme amongst the school community. Overall, despite the multidimensional, unpredictable nature of the classroom setting, the researcher would argue that it is important to undertake research in environments where children learning naturally takes place so it provides an evidence base for conducting reading research in educational settings.

7.3.1 Scalability and Fidelity. Scaling up EDR intervention programmes, whilst ensuring high fidelity, can be challenging due to the context-specific focus of their design and implementation, and involves somehow adapting an intervention programme, successful in a local setting, to effective usage in a wide range of contexts (Dede, Honan, & Peters, 2005). Unfortunately, in education the ‘one-size-fits-all’ model does not apply when scaling up, because a pedagogical strategy that is successful in one particular classroom setting with one particular group of children frequently does not succeed in a different classroom with other children. In education, intervention programmes tend to be multidimensional and highly contextually dependent, involving consideration of not just what and how long a practice is taught but also how well (Harn, Parisi, & Stoolmiller, 2013). Scaling educational intervention programmes without realising that their effectiveness is often eroded by variations in context may result in a what is known as the

‘replica trap’: repeating everywhere what worked locally without taking into account the individual needs of particular contexts (Wiske & Perkins, 2005).

Dede (2005) offers some guidance on how to go about scaling up the implementation of a classroom-based intervention, while taking into account variation in individual contexts. He suggests that designers of interventions need to differentiate the intervention programmes design from, what he terms, ‘conditions of success’. Dede used the analogy of the iPod to explain this further. While every iPod is identical in its design, users have the opportunity to individualise their experience when using it by uploading their own music onto it. The individualised experience of using the iPod does not affect its overall design.

The founders of the Incredible Years Programme (Webster-Stratton, Reinke, Herman, & Newcomer, 2011) considered such issues when designing their programme for widespread implementation across different cultural contexts. They considered three components to be critical for scaling up an intervention across different contexts, while, at the same time, achieving appropriate fidelity. The three components are as follows:

1. **Build in adaptations:** This involves ensuring that those implementing the programme can identify and understand the essential features of the programme. In doing this, implementers can identify essential parameters within which variation can and cannot be applied to match individual contexts. In the context of the current research, this would mean that teachers implementing the programme recognise that the manner in which various tasks are introduced in the programme cannot be varied as these reflect the developmental progression of phonological awareness skills; however, the adaptation of resources, personnel, and the duration and intensity of the programme can be adapted to suit individual contexts.

Webster-Stratton et al. (2011) suggest that when scaling up programmes,

the inclusion of supplemental materials/adaptations that are reflective of the contexts within which teachers may find themselves should be included with the programme.

2. **Differentiating professional development:** This component takes into account the varying degrees of content knowledge and experience that teachers have depending on whether they are novice or experienced. In the Incredible Years programme, Webster-Stratton et al. (2011) required experienced teachers to undertake six weeks of training, while novice teachers were also required to undertake additional modules. In light of the current research, additional professional development might be considered for teachers who have taught in the senior classes for a number of years, as they may need to refresh their knowledge of the emergent literacy skills required by beginning readers.
3. **Contextualising and embedding training:** Training for the Incredible Years programme takes place within the context of individual schools to ensure that training is contextualised and embedded for teachers who implement it. The researcher would contend that this is important to consider in the scaling up of the phonological awareness programme implemented in this dissertation to ensure the programme is both contextualised and embedded. Communities of practice could be established where teachers implementing the programme could reflect on and evaluate its effectiveness with other teachers who are implementing it, perhaps even in other schools. Due to the time pressure already experienced by teachers, this could be done remotely using technology that promotes shared dialogue between users.

Ultimately, the researcher would contend that in attempting to scale up an

educational intervention programme, it is important to strike a balance between implementing such a programme with fidelity and integrity, while at the same time allowing for adaptation to suit a variation of different educational settings. Such adaptation can be achieved if designers of educational programmes identify essential parameters within which variation can and cannot be applied and ensure this information is relayed to teachers who are considering implementing the programme.

7.3.2 Bridging the research-practice divide. The Design-Based Research Collective (2003) argued that ‘educational research is often divorced from the problems and issues of everyday practice’. The researcher found that EDR, as a methodological approach, proved to be excellent in attempting to reduce the research-practice divide that often exists in education. As discussed in Chapter Two, the research community has long known about the benefits of instruction at the crucial phoneme level, yet, frustratingly, it would appear that such research is not making its way into the classroom context as expected (Cheeseman et al., 2009; Cunningham et al., 2004; Moats, 1994; Moats & Foorman, 2003).

Working closely with practising teachers, sharing professional expertise, and ensuring that the teachers implementing the programme had a voice on how the programme could be adapted to suit the needs of the children they were teaching, allowed for the bridging of the gap between the content knowledge of the researcher and the expert knowledge of the teachers regarding what works in his/her own classroom setting. During the course of the research, both learned from one another. The researcher provided professional development for the teachers and was on hand to address any questions about the content of the programme, while the teachers helped to shape how the programme would work practically in a classroom setting. Furthermore, the teachers provided pedagogically sound suggestions when implementing the programme and addressed practical issues ranging from the duration of instruction for each task to suggesting

adaptions of the resources that were supplied by the researcher. Therefore, the researcher would argue for the importance of working closely with practising teachers and ensuring researchers listen closely to what teachers have to say about implementing intervention programmes within classroom settings. It is hoped that such a collaborative approach can bridge the gap between the existing research-practice divide that is often evident in reading research (Dillon et al., 2000). In this regard, EDR should be considered a powerful approach for ensuring that the research community engages with and works collaboratively with practising teachers in order to share knowledge of how best children learn.

7.3.3 Ethical considerations. One area that requires more attention when adopting EDR is the area of ethics. EDR, as a research methodology, is in its infancy and does need to address issues such as ethical considerations when conducting research in a classroom setting, as little has been written in this regard. In the context of this dissertation, the quasi-experimental design of the research required children to be assigned to either a control or an experimental group. This meant that those assigned to the control group did not receive the phonological awareness programme and instead continued with the ‘usual’ literacy programme of the school. As the research was being conducted within a classroom setting, this raised a number of ethical issues, and, unfortunately, answers were not to be found in any of the literature on EDR. Therefore, while EDR strives to ensure that it addresses practical solutions to complex problems within real-life contexts, it has a duty to protect participants and researchers who are working in such contexts. Ultimately, more has to be done in this regard by those who continue to uphold EDR as a sound and robust methodological approach.

7.4 Chapter Summary

The results of the NAERM 2014 (Shiel et al., 2014) highlighted that a significant and prevailing gap exists in the reading abilities of children who attend DEIS urban Band 1 primary schools in Ireland. While a number of literacy initiatives had been, and continue

to be, introduced, the gap still pervades. The researcher would argue that many of these literacy initiatives are occurring too late in children's reading development. The research investigated in this dissertation highlights that the introduction of an explicit and systematic, teacher-led phonological awareness programme, focused at the crucial phoneme level, in the first year of formal schooling can bring about improvements in young children's phonemic awareness skills and, therefore, should be implemented as part of teachers' existing literacy instruction in DEIS primary schools, as a matter of urgency. It is hoped that such a programme, which focuses on the prevention of future reading difficulties, will give young children the secure foundation needed to take full advantage of beginning reading instruction and, thereby, go some way to reducing the consistent reading gap that continues to exist in our primary schools.

Furthermore, the provision of professional development for teachers, to improve their content knowledge in phonemic awareness, needs to be addressed. The findings from this research suggests that when teachers engage in experiential learning, and when they have a voice in how programmes are implemented in their own classroom, this can lead to a growth in content knowledge but, more importantly, can also make a lasting difference to classroom instructional practice. Research that is based in real-life classroom settings needs to continue to develop in order to provide more substantial evidence that demonstrates not only whether reading programmes work in classroom settings but also, more importantly, why they work (when they do) and for whom. It is hoped that the continued development of educational design research will, ultimately, reduce the divide that continues to exist between reading research and its findings being implemented in classroom practice.

8.0 Conclusion

The dissertation concludes with an overview of the contribution of this research to the areas of emergent reading, phonemic awareness and educational disadvantage. A number of implications for national policy in relation to reading in the early years of primary school are then outlined. The chapter concludes with the identification of a number of possible areas for future research based on the findings of the two studies documented in this dissertation.

8.1 Contributions of this Research

8.1.1 Research within an Irish context. While a large number of phonological and phonemic awareness intervention studies have been conducted internationally, no study to date in Ireland has investigated the impact of introducing an explicit and systematic, teacher-led phonological awareness prevention programme, focused at the crucial phoneme level. Studies such as the one reported here are crucial, as the policy in Ireland in the past has been to adopt literacy interventions from other jurisdictions, in particular, from New Zealand and Australia. Therefore, it is important that policy makers recognise that there now exists a growing body of literacy studies conducted in Ireland that demonstrate evidence of success in an Irish context.

8.1.2 Teacher-led, classroom-based programme. A novel aspect of this phonological awareness prevention programme is that it was implemented, evaluated and co-constructed with teachers in their own classroom setting with the support of the researcher.

8.1.3 Socioeconomic setting. In the research literature, phonological and phonemic awareness programmes have been introduced in a range of settings but most notably within the area of special education. Few studies have examined the impact of socioeconomic disadvantage on young children's phonological awareness skills, therefore,

the research conducted in this dissertation contributes to this small, but growing, number of research studies.

8.1.4 Content of the implemented programme. Numerous studies have examined the effects of introducing phonological awareness programmes to young children; however, few have comprehensively focused instruction at the crucial phoneme level. The particular focus of instruction at the phoneme level in the implemented programme is novel and the findings of Study Two demonstrate that the introduction of such an programme can improve the phonemic awareness skills of young children attending a DEIS urban Band 1 school.

8.1.5 Creation of a phonological awareness programme for classroom teachers. One of the more direct contributions of this research is the production of a research-based, phonological awareness prevention programme, focused at the crucial phoneme level, that can be implemented by teachers working in DEIS schools in Ireland. At present, there are few resources available in Ireland that focus on the area of phonological awareness, and even fewer that focus on instruction in phonemic awareness skills. The phonological awareness prevention programme, designed by the researcher, appropriately supports children attending DEIS urban Band 1 schools by ensuring the programme delivers instruction in a more explicit, intensive, and scaffolded manner (Foorman & Torgesen, 2001)

8.1.6 Creation of a more time-efficient method of assessing children's phonemic awareness skills. While at a prototype stage, it is hoped that the iPad-based phonemic awareness assessment tool can, with future development, prove to be a more time-efficient method of assessing young children's phonemic awareness. In the future, class teachers could use this tool with confidence in their own classrooms to assess and monitor children's progress in phonemic awareness especially during their first year of formal schooling.

8.1.7 Transformation of classroom practice. The EDR process of implementing, co-constructing and evaluating the phonological awareness prevention programme, brought about a significant and sustained change in classroom practice both for the expert-teachers and for the wider school community. This experiential form of learning had the power to change the expert-teachers' beliefs and, ultimately, bring about sustained changes in their classroom practice.

8.2 Implications for National Policy

In general, the research conducted in this dissertation raises four implications for policy at a national level.

8.2.1 Introducing preventive literacy initiatives. A change is required in the way we approach the teaching of emergent reading skills in DEIS urban Band 1 schools, and, we must, as a matter of urgency, introduce more preventive measures to tackle future reading difficulties. The researcher contends that the phonological awareness prevention programme implemented in this dissertation should be mandated by the Department of Education and Skills, and implemented in junior infant classes in DEIS urban Band 1 schools in Ireland in an attempt to prevent future reading difficulties.

8.2.2 Providing support for teachers. It is crucial that teachers teaching infant classes in Ireland

- understand the importance of phonemic awareness as a basic building block of reading
- understand how it helps young readers to crack the alphabetic code
- are well versed in how to provide instruction in this crucial skill

The *Literacy & Numeracy Strategy* (DES, 2011) explicitly identified the importance of teachers acquiring such an understanding and recommended 'that teachers understand the process by which early reading is acquired and how reading skills are subsequently developed and consolidated ...' (p.30). The strategy also highlighted the key

skills to be taught in the infant classes such as ‘teaching the basic building blocks of reading: awareness of words and word parts (phonological and phonemic awareness), letter-symbol recognition, phonics (letter-sound rules), word identification, fluency, vocabulary and comprehension (the ability to derive meaning from text)’ (p.31). However, there is little stated in the document with regards to supporting teachers’ acquisition of this knowledge.

The primary school curriculum itself is an important resource to provide teachers with the content knowledge necessary to teach crucial skills such as phonemic awareness. While a lack of attention to both phonological and phonemic awareness was in evidence in the 1999 English curriculum (NCCA, 1999), in 2016, the Primary Language Curriculum (junior infants to 2nd class) (NCCA) was introduced in Ireland. Importantly, the terms ‘phonological awareness’ and ‘phonemic awareness’ are explicitly stated, in their own right, as learning outcomes in the curriculum. Support material for teachers is provided explaining both terms and offering advice and guidance regarding its instruction. However, on a more worrying note, there are inaccuracies within the document regarding the developmental progression of phonological awareness. In the Progression Milestones (which run from a-h) accompanying the curriculum, Milestone C states that children should ‘generate rhyming words, recognising onset and rime’. This is introduced before Milestone D, where syllable awareness is mentioned for the first time. These milestones do not reflect the developmental progress of phonological awareness. Such inaccuracies in a document which every primary school teacher in the country is expected to adhere to, only adds to the confusion teachers already have around this crucial area and needs to be corrected as a matter of urgency. Ironically, the *Better Literacy and Numeracy for Children and Young People* (DES, 2010) document advised that ‘we have to ensure that school curricula define unambiguously what children should learn at each stage of their development’ (p. 25). The researcher contends that if the Department of Education and

Skills wishes to bring about sustained change in reading levels in DEIS urban Band 1 schools, they need to provide infant teachers with more sustained and embedded professional development in phonological and phonemic awareness.

8.2.3 Providing provision for more intensive instruction. According to Foorman and Torgesen (2001), children identified as ‘at-risk’ of experiencing future reading difficulties, such as those attending DEIS urban Band 1 schools, need to receive more teaching and learning opportunities per day than other children in order for them to ‘catch up’ on their peers. According to Torgesen (2002), this can be achieved in two ways. In the first instance, classroom instructional time must be increased. While the provision of more time for the teaching of English was welcomed in the *Literacy and Numeracy Strategy* (DES, 2011), the researcher would contend that even more time is required in DEIS urban Band 1 schools to teach and reinforce vital early reading skills. At present, approximately fifty minutes per day is allocated for the teaching of English in infant classes regardless of whether a school is recognised as a DEIS school or not. Considering that children attending DEIS schools are already beginning formal schooling with deficits in their phonemic awareness skills (as evidenced in Study One of this dissertation), the researcher would argue that additional time or a special dispensation be given to the teaching of English in infant classes in DEIS urban Band 1 schools.

Alternatively, Torgesen (2002) suggests that instruction can be intensified by grouping children in smaller groups. In order to facilitate the small group intensive instruction that is required when developing young children’s phonemic awareness skills, consideration must be given to further reducing the teacher-pupil ratio in infant classes in DEIS urban Band 1 schools or increasing the supply of additional teaching staff so that, where necessary, children can work in small groups in order to receive more individualised and differentiated instruction.

8.3 Future Research in the Area

The final section of this chapter highlights possible areas for future research in light of the research conducted in this dissertation.

8.3.1 Examine the impact of a phonological awareness prevention programme on children's later reading ability. Future research could look at assessing children's phonemic awareness skills in junior infants and, after the implementation of an explicit phonological awareness prevention programme, assess the children's reading when they have reached second class to investigate the impact of such a programme on children's later reading ability.

8.3.2 Document teachers' content knowledge of phonological and phonemic awareness. Further research needs to be conducted to examine current infant teachers' content knowledge in the areas of phonological and phonemic awareness in Ireland.

8.3.3 Utilise the predictive nature of phonemic awareness to introduce tiers of learning. Introducing tiers of learning depending on the outcome of assessment of children's phonemic awareness could be investigated. Ultimately, groups of children would receive specific explicit instruction based on their level of ability as determined by the assessment.

8.3.4 Examine the impact of the home literacy environment on young children's phonological awareness development. Future studies could examine and identify the reasons why children from lower socioeconomic backgrounds begin school with lower levels of phonemic awareness.

8.4 Chapter Summary

The overall aim of this dissertation was to contribute to reducing the inequality gap in reading as evident in recent national reading assessments. The researcher posits that reducing such a gap requires a shift in thinking from the remediation of reading difficulties to the possible prevention of such difficulties in the first instance. Indeed, Study One of

this research demonstrated that gaps in reading ability are evident even before formal reading has begun. However, the introduction of the explicit phonological awareness prevention programme, focused at the crucial phoneme level, implemented as part of this dissertation, brought about sustained improvements in children's phonemic awareness skills in a DEIS urban Band 1 school; in fact, in some instances, the children's scores surpassed those of their peers attending a non-DEIS school. These improvements in the children's phonemic awareness skills will provide them with a strong foundation upon which to build future reading.

Not only did the research improve the children's phonemic awareness skills, but the expert-teachers involvement in implementing, co-constructing and evaluating the programme also brought about changes in teachers' beliefs regarding the importance of teaching phonological awareness. This, consequently, brought about sustained changes both to the teachers' own classroom practice and to practice within the wider school community.

Overall, this research demonstrates that if we want to reduce gaps in reading ability between children from different socioeconomic backgrounds, we need to focus attention and funding on addressing reading inequality before formal reading begins. The phonological awareness prevention programme created and implemented in this research is a significant tool for addressing reading inequality and provides young emergent readers with a sound beginning for reading.

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Appendices

Appendix A

Study Timeline

Creation of iPad-based PA assessment tool	<ul style="list-style-type: none"> • October 2014 – May 2015
Piloting of iPad-based PA assessment tool	<ul style="list-style-type: none"> • June 2015
Assessment of DEIS and non-DEIS cohorts	<ul style="list-style-type: none"> • September 2015
Control Group Assessment	<ul style="list-style-type: none"> • September 2015 • January 2016 • June 2016
Creation of phonological awareness programme	<ul style="list-style-type: none"> • January – June 2016
Professional development for experimental group junior infant teachers	<ul style="list-style-type: none"> • June 2016 • September 2016
Pre-implementation assessment of experimental group	<ul style="list-style-type: none"> • September 2016
Implementation of phonological awareness programme to experimental group	<ul style="list-style-type: none"> • October 2016 – January 2017
Post-implementation assessment of experimental group	<ul style="list-style-type: none"> • January 2017
Follow-up assessment of experimental group	<ul style="list-style-type: none"> • June 2017
Focus-group interview with expert-group teachers	<ul style="list-style-type: none"> • June 2017

Appendix B

Samples of completed teacher's log

Teacher A

	Tick	Comment
Syllable Buzzle		
Syllable Say (group)	✓	The children clapped out the syllables of the picture card. This was a good introductory game to syllables. We started off by clapping out the syllables in our names.
Syllable Bingo (group)	✓	This game worked well. I just fused the picture cards and picture bingo mats and just got the children to clap out the syllables and count them if they could.
Syllable Sort (group) Grid.	✓	The children made sets of 10 syllable words rather than a grid. This game worked well also.
Feed the Animals (whole class)	✓	The children really enjoyed this game. They had no trouble understanding the concept of the game. They found 4 syllable words hardest to clap out.
Reading Station		

As the week went on the children were concentrating more and listening for every syllable.

4

Initial Phoneme Checklist

	Tick	Comment
Group One Card Out	✓	This game worked well as it was very visual for the children. The images were quite difficult so if I was to use it again I'd have easier images.
Group Pack-a-Backpack	✓	None isolated a group of cards before beginning this game - words that she felt the children would be familiar with. It worked well.
Whole class Getting to Know You	✓	Only some children grasped the concept here - they were more hung up on the different subjects rather than on the sound work.
Whole class Go Fish	✓	a good clear game - the children understood how to play - the images were just too difficult and there were too many.
Sound Shopping	X	
Group Phoneme Dominoes	✓	again a great game - some words were too difficult and there was too many images though - I think a simplified version would work better.

Feed the Monster - an excellent game the children loved choosing words that had the correct initial sound - very

Appendix C

Example of teacher's monthly progress report

Month	Handwriting/Writing	Jolly Phonics	Phon. Awareness/Rhymes
September	<p>hand / finger exercises fine motor work - playdough, threading, pegboards, cutting. Crayon grip - colouring in. handwriting patterns in copies: — 2. llll s. mm 4. mm (overwriting highlighters) top to bottom, left to right</p>		<p>Listening Skills Development through games & drawing activities dictations. Simon Says Fruit Bowl. Elephant/Teddy game (twinkl)</p> <p>Humpty Jack & Jill Miss Polly</p>
October	<p>Hand & finger exercises fine motor activities tweezers, insets, playdough. Overwriting handwriting patterns with crayons ww -l-l-llll mm. First Steps Record Pictorial recording Who? What?</p>	<p>Introduced idea of letter sounds. letter sound 's' song, action, story, words.</p>	<p>Listening Skills. Rhyming activities rhyming words 2 little Dickie Birds Inay Winy Spider Five little Pumpkins Hickory Dickory Dock</p>
November	<p>Hand & finger exercises fine motor activities. Letter formation c, o, a, d overwriting in copies with pencils worksheets, sandpaper letters, writing in sand tray. First Steps Record pictorial recording Who? What?</p>	<p>Letter sounds a, t, i, p, n, ck, e, h, words beginning with, song, action. Bugs for first group.</p>	<p>Rhyming words. Rhyming stories. Old Mother Hubbard I'm a little teapot Pat-a-cake Little Miss Muffet</p>

Month	Handwriting/Writing	Jolly Phonics	Phon. Awareness/Rhymes
December	<p>hand & finger exercises & rhymes - fine motor activities - Jon - the - dork & tracing outlines with pencils.</p> <p>letter formation - g, q, r</p> <p>chr wrote sounds on menus, playplans & letters to Santa</p> <p>First steps - recount who & what @ procedure on how to make long stick candy</p>	<p>Letter sounds - h, i, m, d, g, o, u, l, s, o, n, action story words beginning with blending to read words containing known sounds.</p> <p>Bingo for 2nd letter group.</p>	<p>• Twinkle Twinkle Little Jack Horner</p> <p>When Santa got stuck up the chimney</p>
January	<p>letter formation o, s, f, l in sand / copies, whiteboards.</p> <p>chr began to write own names.</p> <p>chr wrote on recount & news plans.</p> <p>First steps - @ recount who & what @ narrative characters, setting, beginning, middle, end.</p>	<p>Letter sounds & digraphs - f, b, ai, j, oa, ie story, actions, songs</p> <p>words beginning with / containing blending to read words.</p> <p>Bingo for 3rd letter group.</p>	<p>• Continuing work on rhyme</p> <p>• Sentence segmentation - dropping cubes into cups / moving counters for each word.</p> <p>- Wee Willie Winkie</p> <p>- Hey Diddle Diddle</p> <p>• The old woman who lived in a shoe</p> <p>• Rain, rain</p>
February	<p>letter formation - i, t, j, k, b, p. copies & whiteboards.</p> <p>continued practice own names.</p> <p>Writing on recount & play plans. Approx spelling.</p> <p>Free writing.</p> <p>First steps recount - who, what, where.</p>	<p>letter sounds & digraphs - ee, oi, z, w, ng. story, actions, songs</p> <p>words beginning / ending / containing blending to read words.</p>	<p>• Syllables - Clipped syllables in own names & other words.</p> <p>Identified number of syllables.</p> <p>• Continued work on rhyme.</p> <p>See Saw Margery</p> <p>How Polly put the kettle on.</p>

Month	Handwriting/Writing	Jolly Phonics	Phon. Awareness/Rhymes
March	<p>letter formation - n, m, h, r.</p> <p>First steps Recant - Who, where, what.</p> <p>Free writing</p>	<p>Sounds - v, oo, s. Story, Song, act. In words with blending to read words.</p>	<p>Syllables - Clapping/clapping</p> <p>Syllables in names & other words.</p> <p>Feed the animals</p> <p>Syllable game - Baa Baa Black Sheep.</p>
April	<p>letter formation v, w, x, y, z. Overwriting practice for first 10 letters & for names.</p> <p>First Steps Recant - Who, where, what.</p> <p>Free Writing</p> <p>First Steps Report - The fireman.</p>	<p>Sounds x, ch, sh, th, qu, ou. Story, song, act. In words with blending.</p> <p>Board game ready to read 4 letter words.</p>	<p>Syllables continued.</p> <p>Mary had a little lamb.</p> <p>Five little firemen</p> <p>Five little monkeys -</p>
May	<p>Revision of letter formation.</p> <p>First Steps Recant - Copying headline sentence.</p> <p>free writing.</p> <p>writing on play cards & news paper</p>	<p>Sounds oi, ue, er, ar.</p> <p>Revision of all sounds & blending.</p> <p>Tricky words - the, are, to, me.</p>	<p>Onset & Rime.</p> <p>The wheels on the bus</p> <p>Rhyming bugs</p>
June			

Appendix D

Focus-group interview questions

1. Can you tell me about the phonological awareness intervention programme in your class – how did it work?
2. What, do you think, is the purpose of such an intervention programme?
3. What difference, if any, has the intervention programme made to your teaching?
4. Can you tell me about pupil engagement during the intervention programme?
5. Can you tell me about the activities/resources used in the programme?
6. What are the strengths of the programme?
7. Have you any concerns about the programme?
8. Can you talk to me about the instructional groupings used in the delivery of the programme?
9. Would you use this programme again in your future teaching?
10. Is there anything that I didn't ask about or that you think I should know?

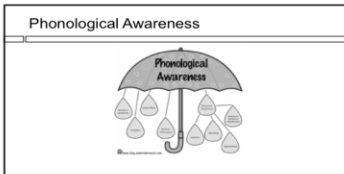
Appendix E

PHONOLOGICAL AWARENESS



Definitions

- Phonological awareness is a broad term that refers to the ability to focus on the sounds of speech as opposed to its meaning, and it has a number of different levels or components.
- Phonological awareness is the awareness of all the sounds of language.
- Phonological awareness is the ability to listen to, recognize, and manipulate the sounds of spoken language.

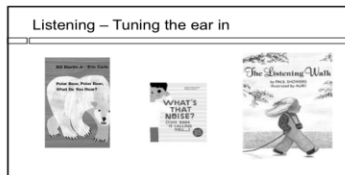
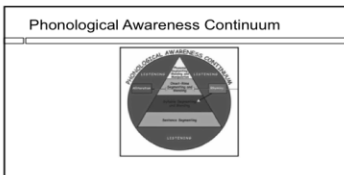


Phonological Awareness

- Speech is composed of subparts
- Sentences** are comprised of words
- Words** are comprised of syllables
- Syllables** are comprised of **onset and rime**
- Individual **phonemes**

Why teach phonological awareness?

- Phonological awareness is directly related to reading ability
- Deficits in phonological awareness are usually associated with deficits in reading
- Early intervention can promote the development of phonological awareness
- Improvements in phonological awareness can and usually do result in improvements in reading ability



Rhyming Activity

- Reading and chanting nursery rhymes, tongue twisters, action songs
- Read stories with a strong emphasis on rhyme – Julia Donaldson, Dr Seuss

Suggested Rhyming Techniques


- Whisper a line of the poem and say the rhyming word in a normal tone
- Say a line of the poem and have the children clap the rhyming word
- Say a line of the poem sitting down and then stand when you say the rhyming word
- When the children are familiar with the poem, stop after the rhyming words. Ask them, "What words do you hear that rhyme?"
- Stop before the second rhyming word and ask the children to tell the word before you read it
- Ask your students to suggest additional words that rhyme with the first word in the rhyming pair

Word Awareness


- See manual for activities

Syllables

- Syllables are ways to split words into speech sounds. We naturally say words using syllables, but we don't usually think about it until we need to separate the syllables for reading or spelling purposes
- Hand under the chin – feel the syllables
- Syllable Suitcase Activity



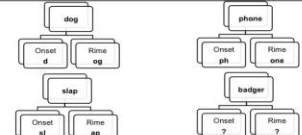
Syllables



Onset-Rime

- Monosyllabic words can be split into two parts - the onset and the rime - each of which are smaller than syllables, but may be larger than phonemes
- The onset is the initial consonant sound (b- in bag, sw- in swim), and the rime is the vowel and the rest of the syllable that follows (-ag in bag, -im in swim)

Examples




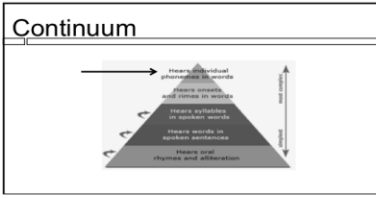
Onset-Rime

- If a child can read "bake" they can use this knowledge to decode and read "cake" and "lake" because they use the same rime
- Understanding how to segment and blend words into onset and rime supports the use of analogies between words in reading and writing
- Rhyming Activity
- The Hungry Monster

PHONEMIC AWARENESS

Phonological Awareness





Remember!

- Phonemic awareness is auditory and does not involve words, letters or print

Phonemic Awareness

- Typically phonemic awareness is the last and deepest understanding of speech that children acquire (Stall & Murray 1994)

Phonemic Awareness

- 'Phonemic awareness, or the ability to hear and segment individual sounds in spoken words, must occur before children can begin to understand how letters represent speech sounds' (Ruzizi and Cooley, 1999)
- 'Phonemic awareness is central in learning to read and spell' (Ehri, 1984)
- 'Phonemic awareness is the most important core and causal factor in separating normal and disabled readers' (Adams, 1990)
- Pupils need solid phonemic awareness training for phonics instruction to be effective and meaningful

Why is phonemic awareness important in learning to read?

Children must understand that the words in their oral language are composed of small segments of sound in order to comprehend the way that language is represented by print

Without at least emergent levels of phonemic awareness, the rationale for learning individual letter sounds, and "sounding out" words does not make sense to some children

Without phonemic awareness, phonics doesn't make sense

Phonemic Awareness

- Phonemes are the **smallest parts of sound** in a spoken word that make a difference in the word's meaning
- For example, changing the first **phoneme** in the word *hat* from /h/ to /p/ changes the word from *hat* to *pat*, and so changes the meaning

Phonemic Awareness

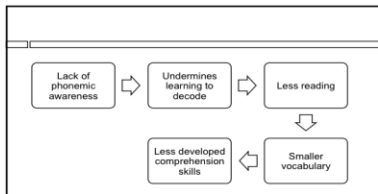
- There are 26 letters in the English alphabet
- There are approx 40-44 phonemes (sounds)
- Sounds are represented in 250 different spellings

/f/

- Phone
- Fish
- Enough
- Different

/a/

- Make
- Rain
- Play
- Great
- Eight
- They



Phonemic Awareness

Children can show us that they have phonemic awareness in a number of ways

- Recognise which words in a set of words begin/end with the same sound
- Isolate the first/last sound in a word
- Break or segment a word into its separate parts
- Blend the separate sounds to make a word

Caution

Pronunciation is everything!!!

Phonemic Awareness – Mouth Position

- Charts
- Mirrors

Phonemic Awareness – Mouth Positions

The MOUTH-ABET

Phonemic Awareness Skills

- Identifying
- Blending
- Segmenting
- Adding
- Deleting
- Substituting

Manipulating

Term	Definition	Example
Phonemic Segmentation	Recognizing individual sounds in a word	Teacher: "What is the first sound in the word 'cat'?" Student: "C."
Blending	Recognizing the same phonemes in different words	Teacher: "What sound does 'cat' have?" Student: "C." "What sound does 'hat' have?" Student: "H." "What sound does 'mat' have?" Student: "M."
Phonemic Awareness	Recognizing the sound in a word and being able to separate the sound from the word	Teacher: "What is the first sound in the word 'cat'?" Student: "C." "What is the second sound in the word 'cat'?" Student: "A."
Phonemic Segmentation	Recognizing individual sounds in a word and being able to separate the sound from the word	Teacher: "What is the first sound in the word 'cat'?" Student: "C." "What is the second sound in the word 'cat'?" Student: "A."
Phonemic Segmentation	Recognizing individual sounds in a word and being able to separate the sound from the word	Teacher: "What is the first sound in the word 'cat'?" Student: "C." "What is the second sound in the word 'cat'?" Student: "A."
Phonemic Addition	Adding one sound to a word to create a new word	Teacher: "What is the first sound in the word 'cat'?" Student: "C." "What is the second sound in the word 'cat'?" Student: "A." "What is the third sound in the word 'cat'?" Student: "T." "What is the word?" Student: "Cat."
Phonemic Substitution	Replacing one sound in a word with another sound to create a new word	Teacher: "What is the first sound in the word 'cat'?" Student: "C." "What is the second sound in the word 'cat'?" Student: "A." "What is the third sound in the word 'cat'?" Student: "T." "What is the word?" Student: "Cat." "What is the first sound in the word 'bat'?" Student: "B." "What is the second sound in the word 'bat'?" Student: "A." "What is the third sound in the word 'bat'?" Student: "T." "What is the word?" Student: "Bat."

Phonemic Awareness Instruction


- Explicit and systematic
- Target only one phonemic awareness skill at a time, such as blending phonemes or segmenting words into phonemes
- Reinforce by more informal teaching - quick bursts interspersed throughout the day
- Fun and engaging activities
- Modelled by the teacher
- Embed through shared reading so children can begin to make connections to print

Phoneme Identity


Old McDonald (to the tune of)
 What's the sound that starts these words:
 turtle, time, and teeth?
 /t/ is the sound that starts these words:
 turtle, time, and teeth.
 With a /t/, /t/, here and a /t/, /t/, there,
 Here a /t/, there a /t/, everywhere a /t/, /t/.
 /t/ is the sound that starts these words:
 turtle, time, and teeth.

Phonemic Awareness – Practical

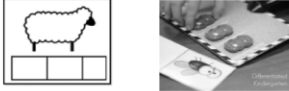
- Croaker Activity
- Phoneme Identification – final sound



Phonemic Awareness - Blending



Phoneme Segmentation – Elkonin Boxes




Phoneme Awareness Activities


- Phoneme fingers



Phoneme Segmentation



Phonemic Awareness - Segmenting




Challenges for Teachers

- Make instruction explicit about the connection between phonemic awareness and reading
- Understand phonemic awareness tasks in order to make informed decisions using ongoing assessments
- Know when students need more phonemic awareness instruction – simple to complex – or when to move on to other reading strategies
- Highlight instruction of blending and segmentation for greatest transfer to reading
- Design engaging lessons that require active participation

Assessing Phonological Awareness

□ <https://vimeo.com/36736110>



Sound Beginnings Programme

- Duration: 12 weeks
- Delivery: Small groupings
- Intensity: 2 x 30 mins sessions per week in small groups and 1 whole-class lesson

Supplemented with informal reinforcement during the week

Structure of Programme	
Week 1	Word awareness
Week 2	Syllable awareness
Week 3	Onset & Rhyme awareness
Week 4	Initial phoneme identity
Week 5	Initial phoneme identity
Week 6	Final phoneme identity
Week 7	Final phoneme identity
Week 8	Phoneme blending
Week 9	Phoneme blending
Week 10	Phoneme segmentation
Week 11	Phoneme segmentation
Week 12	Revision of phoneme blending and segmentation

Gradual Release of Responsibility
<ul style="list-style-type: none"> □ Focus lesson □ Guided instruction □ Collaborative learning □ Independent practice <p style="text-align: center; font-size: small;">(Pearson & Gallagher, 1983)</p>

Structure of lessons	
Structure of Lessons	Time Allocation
Review from previous lesson and outlining of objective of new lesson	5 mins
Activities to support new phonological awareness skill targeted for instruction modelled by the teacher and practiced by the children	20 mins
Shared reading with emphasis on phonological awareness skill targeted that week	5 mins

Appendix F

Sample of scores for non-DEIS cohort

ID	Initial 1	Initial 2	Initial 3	Final 1	Final 2
1	9	9	10	10	9
2	1	3	8	2	2
3	6	5	10	3	2
4	3	4	10	1	5
5	8	10	10	5	9
6	10	10	10	6	10
7	3	7	10	3	3
8	10	10	10	6	5
9	6	7	10	5	5
10	8	10	10	4	2

Final 3	Blend 1	Blend 2	Seg 1	Seg 2
10	12	13	4	4
3	7	9	4	5
6	7	13	6	6
6	4	4	4	7
10	8	12	3	6
10	13	14	7	8
5	7	12	0	0
8	14	12	11	10
5	7	11	2	9
9	8	12	9	10

Sample of scores for DEIS 16 cohort

ID	Initial 1	Initial 2	Initial 3	Final 1	Final 2
1	4	9	9	3	5
2	3	7	7	2	6
3	2	3	7	2	2
4	6	10	10	4	6
5	8	8	8	3	5
6	3	8	7	3	2
7	3	4	10	2	4
8	3	7	10	2	2
9	2	5	9	1	0
10	4	7	4	3	3

Final 3	Blend 1	Blend 2	Seg 1	Seg 2
4	7	12	0	0
7	2	4	2	3
4	6	11	8	5
10	3	13	4	14
9	9	12	4	11
2	6	4	1	6
5	6	10	6	17
5	6	11	1	8
0	5	13	1	9
6	7	5	4	4

Appendix G

Ethics Approval

Dear Jennifer

I am in receipt of your research ethics approval form and note that your supervisor has signed off indicating that no further action is needed on the part of the Research Ethics Committee. Therefore, ethics approval is granted for your project on condition that it is carried out as indicated on your approval application.

Should there be a change in your research project design you will need to apply again for ethics approval. You will be required to sign a statement on submission of your thesis to declare that the research was carried out using the design and methods approved.

Best wishes for the success of your project.

Kind regards,

Kristina Karpovas
Executive Officer at the School of Education
on behalf of Professor Stephen Minton
Director of Research

Appendix H

Letter of information to parents

Jennifer O'Sullivan

TCD

BUILDING SOUND FOUNDATIONS IN PHONEMIC AWARENESS

PhD-Study | Trinity College Dublin

Lead Researcher

Jennifer O'Sullivan worked as a primary teacher in [REDACTED] for eight years and is currently on secondment to Marino Institute of Education, where she lectures to undergraduate and postgraduate students in literacy. She completed an MEd in literacy (DCU) and is currently studying for a PhD with Trinity College Dublin.

Contact Details

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Supervisor's contact details:
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School of Education, TCD
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Schedule

The study entails the assessment of children's phonemic awareness at three points during the school year:

- September 2015
- January 2016
- June 2016

The Study

I am interested in investigating children's readiness for reading at the beginning and, again, at the end of junior infants. I will be focusing on an aspect of reading known as phonemic awareness. This involves children being able to hear and manipulate the sounds of their spoken language before being introduced to letters.



The purpose of this study is to establish the current phonemic awareness levels of children in order to create a phonemic awareness programme that can be taught to Irish junior infant children in the future.

In order to conduct this research, I require you, as a parent/guardian, to consent to your child taking part in the study. This document will outline some of the main information relating to the study but, if you have any further questions, please do not hesitate to contact me directly. I have approached the principal of the school, [REDACTED] and she is happy to allow me to conduct my research in [REDACTED].

Assessment

The assessment will involve groups of four/five children being brought to a suitable room within the school building. The assessment will be presented to the children, individually, in a game format on iPads. They

September 2015

1



Letter of Consent

If you are happy for your child to take part in this study, please complete the attached form and return it to your child's class teacher by **Friday, 18th September**.

will be asked to complete a number of tasks such as looking at a picture of a dog and finding another picture that begins with the same sound. The assessment should last no longer than 30 minutes.

I will assess the children along with one other assessor. All those involved in the study will have Garda clearance and have experience working with young children. The school have agreed to release a resource/learning support teacher to conduct some of the assessments too. The children will be accompanied by an adult at all times during the assessment.

Storage of Information

The information gathered from this study will be stored on a password-protected, digital database. I will be the only person who will have access to this database. Any printed documents will be kept in a secure filing cabinet. All data will be deleted once the study has been published.

Confidentiality and Anonymity

In order to avoid any child's information being identified during the study, I will ensure that the children's information will be coded with a number instead of their name. I will be the only person who will be able to identify the children in the study. However, I would ask permission to share the results with your child's class teacher, as it will be very beneficial for him/her to use the information when teaching reading to your child during the course of the year.

Right to Withdraw

Your child's right to refuse to take part in the study will be respected at all times. If your child does not wish to leave the classroom or wants to return to their class during the assessment, this will be respected. Also, as the child's parent(s)/guardian(s), you are free to withdraw your child from the study at any time without stating why.



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UNIVERSITY
OF DUBLIN

Appendix I

Parental consent form

Jennifer O'Sullivan

TCD

PARENTAL/GUARDIAN CONSENT FORM

PhD-Study | Trinity College Dublin

Child's details (Please complete the following):

Name:

Date of birth:

Class teacher's name:

Is English your child's
first language?

If no, what is your child's
first language?

Has your child ever
been diagnosed with a
speech or hearing
disorder?

Has your child used an
iPad or tablet before?

- **I have read the information provided**
- **Details of the assessment procedure have been explained to my satisfaction**
- **I understand that participation is voluntary and that it is ok to withdraw my child from taking part at any time**
- **I understand that my child's information will be confidential through the use of an identification number**
- **I understand that while the findings found in this study will be published, my child will not be identified, and individual information will remain confidential**
- **I understand that my child may withdraw at any time from the project**
- **I give consent for the lead researcher to share my child's result with his/her class teacher**

I _____ being over the age of 18 years hereby
consent to my child _____ participating in the
study 'Building Sound Foundations in Phonemic Awareness'.

Date: _____

Please return to your child's class teacher by **Monday, 12th September**

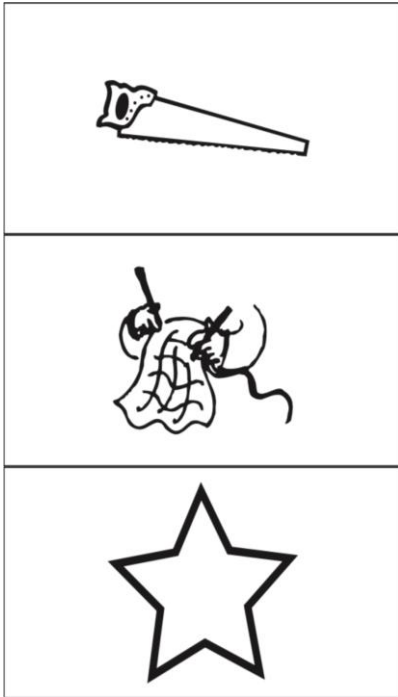
1

Appendix J

Example of images used over the duration of the phonological awareness programme. Set A presents examples that were first used and amended over the course of the programme.

Set B includes examples of the more child-friendly, colourful images that were introduced.

Set A

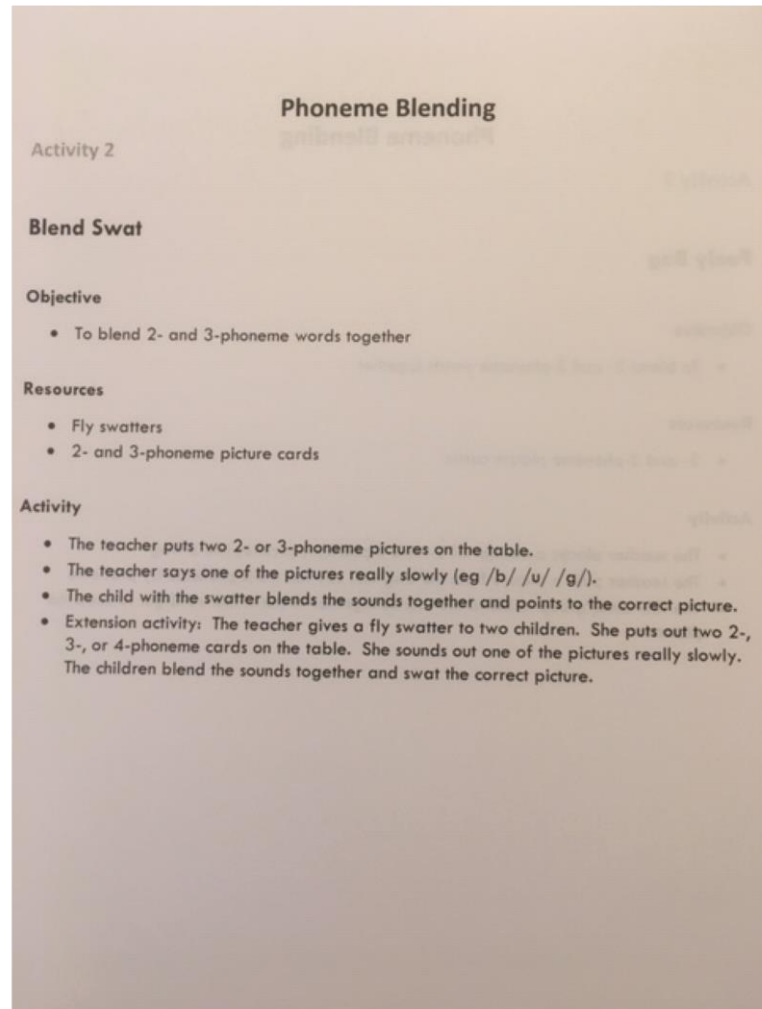


Set B



Appendix K

Example of description of phonological awareness activities as included in teacher resource pack for each task.



Phoneme Blending

Activity 2

Blend Swat

Objective

- To blend 2- and 3-phoneme words together

Resources

- Fly swatters
- 2- and 3-phoneme picture cards

Activity

- The teacher puts two 2- or 3-phoneme pictures on the table.
- The teacher says one of the pictures really slowly (eg /b/ /u/ /g/).
- The child with the swatter blends the sounds together and points to the correct picture.
- Extension activity: The teacher gives a fly swatter to two children. She puts out two 2-, 3-, or 4-phoneme cards on the table. She sounds out one of the pictures really slowly. The children blend the sounds together and swat the correct picture.

Example of description of phonological awareness activities as included in teacher resource pack for each task.

Activity	Procedure
Pack-a-Backpack	Place 2-3 backpacks and initial sound objects on the table. Teacher places a target object on each backpack (eg. an carrot). Taking turns, pupils select an object (eg. a cat), name the object and say its initial sound. Pupil determines which backpack matches the selected object and places the object on the corresponding backpack. Continue until all objects are sorted.
Getting to Know You	Ask children to name their favourite hobby/treat/food. Explain that their favourite must begin with the same sound as their first name (eg. Jen likes jam and jelly). Ask the children to draw pictures of themselves with their favourite hobby/treat/food.
Go Fish	Shuffle the pack of picture cards and give each child 4-5 cards. The remaining cards are the 'pond' and are placed in the middle of the table. Children look at their own cards and put aside any matching cards that begin with the same sound. The children look at their remaining cards and ask someone at the table for a picture card that begins with a certain sound to match one of their remaining cards (eg. Do you have a picture that begins with /r/?). If yes, the child takes the card, says the initial sound of both pictures and places the match aside. If no, the asked child says 'Go fish for a match'. The child selects a card from the 'pond'. Continue until all cards are matched.
Sound Shopping	Each child is given a bag with a target picture on it and is instructed to 'go shopping' and only buy those items that begin with the same initial sound that is on their bag. After placing the correct pictures in the bag, each child shares with the group what they bought.
Phoneme Dominoes	Scatter the dominoes face up on a table. Taking turns, one child places the 'start' domino on the table, names the picture on the other side of the domino and says its initial sound. The next child looks for a domino with a picture that has the same initial sound, names it, and says its initial sound. They connect the dominoes. Continue in this manner until all dominoes are connected.

Appendix L

Sample transcript of focus-group interview

JOS: So you mentioned there about the activities and the resources so how did you find, I suppose let's talk towards the end because we did some adaptation and taking your feedback with the pictures and we stuck then to CVC words rather than bringing in words with blends, so how did you find some of the later resources then?

MK: Really good. They were bright, child-friendly and resources like the Elkonin boxes were really good because we started off using pompoms for every sound they hear and now we can actually use it for what we're doing at the moment and we can use the letters and it's less work for us cause they've seen the pictures before and now they just put in the letters instead of the pompoms for each sound. SO that was a favourite in my class.

JOS: And what about the instructions, were you able to follow them ok?

RW: Even just having this page on the front is handier than having all of sheets with the instructions

JOS: OK

RW: And it told us what to do in week one and week two, whereas sometimes we were doing a game that really should have been in week two in the first week. We really didn't know the ..

JOS: Progression?

RW: The progression exactly.

JOS: So did you all like that structure or did you feel that it was very prescriptive?

MN: No

RW: No, I much preferred it.

KOB: It was much easier.

MN: It's kind of like *Ready Set Go* for literacy having it step by step

JOS: And then you mentioned about the instructional groups. It was great because the team teaching was already in place here and you were able to do some within small groups and then some whole class. How did you feel that went?

KOB: Yeah, the whole class went well. I did the trucks, the family of trucks game with the whole class and that went really well but I do think it's better when you have them in a small group I suppose cause it's the same in every class, some of them flew through it, some got there in the end and some children are still really struggling with it. I'd have some that just didn't .. I lost them in whole class

RW: They just didn't engage as much as the bright children who just got it

KOB: There was a real definite they either got it or they didn't I think with all of the stages

JOS: You could see that, could you? The ones who were getting it and ..

KOB: There didn't really seem to be a group in the middle as such. It was really we have it or we don't. It was very definite.

JOS: OK

KOB: In my room anyway

JOS: So, could you see that becoming an issue for those same children if you were just introducing letters from the start?

MK: Definitely

RW: Yes they'd be much slower grasping the letter sounds. Like I was comparing them to last year, that those kind of middle group of children, I'd find that this year the middle group are finding the Jolly Phonics much easier now after having that basis. Whereas the middle group last year struggled a lot more with Jolly Phonics

KOB: There don't seem to be issues with Jolly Phonics now, I don't think.

RW: Yeah, that's the thing, they just seem to be getting it. So those middle children are at a much higher level than my class last year.

MN: And we moved much slower last year, as well. One letter a week.

KOB: Whereas we're now doing six letters in a fortnight. One a day for six days and then four days of blending and segmenting and they're well able for it

RW: They're flying through it. We're on the digraphs now and even with them they're, they just took it all on board.

Appendix M

List of two, three, and four phoneme words used during the phonological awareness programme.

Two, Three and Four Phoneme Words
Words with 2-phonemes ape bee egg fir knee pea tea two zoo
Words with 3-phonemes ant bat bed big bike boat book bug can dig dog face fan fin foot ham hat hot jail cap cat cave kiss cup lake mat pig net night nut pot rat road sad sun van
Words with 4-phonemes (used for extension activities) crab flag mask lamp sand swim frog stop truck plug drum jump brush brain skate train sleep sweet