Word learning and vocabulary development in children with English as an additional language

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Submitted in accordance with the requirements for the degree of Doctor of Philosophy

The University of Leeds
School of Psychology

August, 2019

i. Acknowledgements

Thanks must first and foremost be given to my supervisory team. To Dr Anna Weighall, thank you for your guidance and support. You have lifted me up and encouraged me through the hardest days of this thesis. Thank you for accompanying me to conferences (despite all the odds!) and smiling and nodding along from the audience. Your belief in me has been there since day one, even when imposter syndrome struck. You have pushed me further than I ever thought possible. Above and beyond my supervisor you are a true confidant and friend.

To Dr Hannah Nash, who is always telling me 'the Devil is in the detail'. Thank you for the time you dedicated to giving me precise and detailed feedback which has shaped this thesis. You have already taught me so much and I look forward to learning more in the future. Thank you for encouraging me to finish and giving me the time I needed to write.

Substantial credit should be given to my family. To my parents Neil and Jacqueline, thank you for everything. There have been some incredibly challenging times during the completion of this thesis and you have stood by my side through it all. You put me back together when I was broken. None of this would have been possible without the endless help over the years, from rehearsing French and German GCSE speaking questions, to checking A-Level coursework. You are the best team, and I love you both so much.

To my sister, Kate. Your strength and resilience through the darkest of times has taught me to hold my head up high and carry on. You are my inspiration, my best friend and the person I strive to be every day. Thank you for always having time for me, despite having so little time for yourself. Eleanor is so incredibly lucky to have you as a role model, let's hope she lets you sleep more in the years to come. To my grandma, June.

Thank you for being my champion. You are always there for me with the kettle boiled and a smile on your face. Your hugs are the best form of stress relief! Love you loads.

To my PhD family. To Natalie, from the first time we met as fresh faced and eager first years, we have supported each other and provided much needed comic relief. Our car journeys together after network meetings will never be forgotten. Perhaps we should put the upcycling business on hold for a while longer. To Alex, your journey has been an unenviable one. Thank you for all of your support and encouragement. Good luck with your thesis and congratulations on the births of your beautiful son and daughter! To everyone else in the SoP over the past four years, especially Emily and Priya. Thank you for being so wise, providing a shoulder to cry on and giving endless advice.

To the research assistants who helped me collect my data, thank you, and I hope your experience in schools has helped you in your future careers.

Finally, thank you to all of the schools, teachers, and children who took part in the experimental studies in this thesis. Without you, none of this would be possible.

ii. Abstract

This thesis presents a systematic review, two experimental studies and a Delphi survey to investigate vocabulary growth for children in the UK with English as an additional language (EAL). A systematic review assessed the strategies used across vocabulary interventions for EAL children (chapter 2). Evidence from 22 interventions suggested that explicit instruction provided the greatest improvements in vocabulary knowledge for EAL children, whereas implicit tasks did not produce such gains. Thus, two novel word learning tasks were designed to compare explicit and implicit learning of novel words in EAL and monolingual (ML) children aged 7-8 years old. In experiment one, (chapter 4), 119 children (67 = EAL; 52 ML) were explicitly taught six novel words. In experiment two, (chapter 5), 80 children (30 = ML; 50 = EAL) heard six novel words embedded in two spoken stories. When the instruction was explicit, EAL children had an immediate advantage of novel word recall over MLs (p=.019), however, under implicit conditions, *poorer* immediate recall (p <.01) was found. Measures of static English vocabulary were measured during experiment one, and repeated one year later (chapter 6). English vocabulary growth over twelve months was predicted by EAL children's ability to learn the phonological aspects of nonwords. Monolingual children's vocabulary growth was not predicted by novel word learning ability. To investigate whether current classroom practice reflected research, teachers were recruited to take part in a Delphi survey (chapter 7). Few specific language and literacy related strategies were offered to EAL children and a lack of professional development was identified. A general discussion about the results of this thesis is given (chapter 8), which considers the implications of findings on children with EAL.

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vi. Abbreviations

BPVS	British Picture Vocabulary Scale: A UK test of receptive vocabulary for children
CELF	Clinical Evaluation of Language Fundamentals
CNRep	Children's Test of Nonword Repetition
DfE	Department for Education
EAL	English as an additional language
EMTAS	Ethnic Minority and Traveller Achievement Service (Liverpool, UK)
GCSE	General Certificate of Secondary Education
L1	The native language/mother tongue
L2	The language being acquired/second language
ML	Monolingual
NALDIC	National Association of Language Development in the Curriculum
ONS	Office for National Statistics
PPVT	Peabody Picture Vocabulary Scale
PRISMA	An evidence based checklist for reporting in systematic reviews and meta-analyses
PROSPERO	Prospective Register of Systematic Reviews: An open access online database of systematic review protocols on health-related topics
RCT	Randomised Control Trial
RRM	Reading Rope Model
SATs	Statutory Assessment Tests
SES	Socio-economic Status
SVR	Simple View of Reading
VIF	Variance Inflation Factor
WASI	Wechsler Abbreviated Scale of Intelligence

vii. Conference Presentations and Publications

2019

Oxley, E., Nash, H., & Weighall, A. (2019, July). Do experimental measures of word learning predict true vocabulary growth in children who speak English as an additional language? Paper presented at the Child Language Symposium, Sheffield, UK.

Oxley, E., Nash, H., & Weighall, A. (2019, April). Do experimental measures of word learning predict true vocabulary growth in children who speak English as an additional language? Paper presented at the Experimental Psychology Society, Manchester, UK.

2018

Oxley, E., Nash, H., & Weighall, A. (2018, July). Learning new words from explicit and implicit exposures in children who speak English as an additional language. Poster presented at EU-Speak3, Newcastle, UK.

Oxley, E., Nash, H., & Weighall, A. (2018, July). Learning new words from explicit and implicit exposures in children who speak English as an additional language. Paper presented at the Canadian Society for Brain, Behaviour and Cognitive Science annual meeting, St John's, Canada.

2017

Oxley, E., Nash, H., & Weighall, A. (2017, October). Does knowledge of more than one language enhance the ability to learn novel words? Paper presented at the Great Yorkshire Memory Meeting, Leeds, UK.

Oxley, E., Nash, H., & Weighall, A. (2017, October). Does knowledge of more than one language enhance the ability to learn novel words? Poster session presented at Many Paths to Languages, Max Planck Institute for Psycholinguistics, Nijmegen, Netherlands.

Oxley, E., Nash, H., & Weighall, A. (2017, October). Does knowledge of more than one language enhance the ability to learn novel words? Paper presented at the British Academy workshop: Language, literacy and learning in children who speak English as an additional language (EAL), Oxford, UK.

Oxley, E., Nash, H., & Weighall, A. (2017, September). Does knowledge of more than one language enhance the ability to learn novel words? Poster session presented at the European Society of Cognitive Psychology, Potsdam, Germany.

Oxley, E., Nash, H., & Weighall, A. (2017, September). A systematic review of word learning interventions in primary school children with English as an Additional Language. Poster session presented at European Second Language Acquisition, Reading, UK.

2016

Oxley, E., Nash, H., & Weighall, A. (2016, October). A systematic review of word learning interventions in primary school children with English as an Additional Language. Paper presented at Education and Migration, Durham, UK.

Oxley, E., Nash, H., & Weighall, A. (2016, October). A systematic review of word learning interventions in primary school children with English as an Additional Language. Poster session presented at Autumn White Rose Psychology Postgraduate Research Conference, University of Leeds.

Chapter 1: General Overview

1.1 Introduction

Multilingualism is commonplace and increasingly more children are learning a ‘first’ language in the home whilst being schooled in a different language (Murphy, 2014, 2018). Current estimates suggest 88 different languages are spoken in the UK in addition to English and Welsh (Stokes, 2013), with the most commonly spoken languages being Polish, Indian and Pakistani heritage languages, Arabic, French and Chinese languages. Worldwide, around two-thirds of children begin to learn a second language in early childhood (Bhatia, Ritchie, & Wiley, 2013, Crystal, 2012). In England, as of January 2018, 21.2% of pupils in primary schools spoke English as an additional language (EAL), a rise of approximately 3.7% since January 2012 (Department for Education, 2012, 2018). The same growth was seen in state funded secondary schools, where 16.6% of pupils in January 2018 were classed as EAL. Since the population of EAL children is increasing across the board, teachers are having to adapt in order to meet the needs of all pupils.

A cross-sectional report by Strand, Malmberg and Hall (2015) identified that there is an attainment gap in reading skills between EAL and monolingual (ML) children at the end of primary school (age 11). This may be due to EAL children’s smaller English vocabulary compared to ML children (e.g. Murphy, 2014). Further risk factors for children with EAL and their long-term school achievement include age of arrival in an English-speaking country and the socio-economic status of the child’s family (Hutchinson, 2018; Strand & Hessel, 2018; Strand et al., 2015). As reading skills are underpinned by vocabulary knowledge (e.g. Beck et al., 2002; Nation, 2001; Qian 1999, 2002; Stahl & Fairbanks, 1986), this thesis examines the vocabulary acquisition of children with EAL in primary schools in the UK.

The following chapter gives an overview and critique of the literature surrounding children with English as an additional language. It consists of three main sections. We begin with an exploration of bilingualism, namely, who are EAL learners and what is their English language profile. Models of reading are explored and we consider how these may relate to children with EAL. The subsequent section looks at vocabulary acquisition and the literature surrounding vocabulary related pedagogy. Finally, we consider existing experimental studies of word learning in bilingual populations and consider whether this may be relatable to children with EAL in the UK.

1.2 English as an additional language (EAL)

1.2.1 Defining English as an additional language

The term *English as an additional language* is used by the Department of Education to define a child exposed to a language other than English during early development, and continues to be exposed to that language in the home or community (Department for Education, 2017). Thus, the term 'EAL' defines a largely heterogeneous group of children, coming from a variety of first language backgrounds and experiences. Children who are classed as EAL have differing levels of fluency in English, which can range from those classed as 'New to English' to those fully fluent in English (Department for Education, 2017). The Department for Education's definition for children who are 'New to English' includes children who remain completely silent, children who may be able to utter a few words or phrase, and those who may understand or use some oral English but have minimal or no English literacy (Department for

Education, 2017). A ‘New to English’ child will vary dramatically in their language proficiency to a child who mainly speaks English, but who has exposure to another language at home through a parent or grandparent. Yet, both may be classed as having ‘English as an additional language’.

1.2.2 English as an additional language in the UK

Although the percentage of EAL children is increasing year on year, having more than doubled in primary schools since 2004 (Department for Education, 2018; Department for Education and Skills, 2005), the distribution varies widely from region to region and from school to school. In 2013, for example, 22% of all schools (including primary and secondary), were classed as having less than 1% of children with EAL, 54% had less than 5% and 68% had less than 10% of EAL children. At the other end of the spectrum, however, around 8% had 50% or more EALs (Strand, Malmberg, & Hall, 2015).

The research which will be presented in this thesis was carried out around inner-city Leeds, West Yorkshire, which falls into the wider ‘Yorkshire and the Humber’ region. This region is no exception to the wide distribution of EAL children mentioned in Strand and colleague’s report (2015). When broken down by sub-region, the East-Riding of Yorkshire sees less than 4% of primary pupils with English as an additional language, which contrasts with 42% of pupils in Bradford. In Leeds, figures are close to the national figures, with around one in five primary school pupils speaking English as an additional language.

The attainment of children with EAL depends on many different variables (Hutchinson, 2018). These variables include home language and age of arrival (if applicable) in the country of schooling. For example, during the final years of primary school, six language groups underperform respective to expected targets, even for those who have been schooled in English since infancy. These language groups are Pashto, Panjabi, Turkish, Portuguese, Czech and Slovak (Hutchinson, 2018).

EAL children, as a group, have a tendency to underperform in reading and writing SATs exams, compared to monolingual peers (Demie, 2018). While studies suggest the EAL children can 'close the gap' (Strand et al., 2015), performance of the weakest children may be masked by those who have full linguistic competency (Demie, 2018).

1.3 English language profile and reading skills of children with EAL

Recent research has revealed that there is a direct relationship between EAL children's English language proficiency (measured by their teachers), and their overall school attainment (Strand & Hessel, 2018). For example, children who had been classed by their teacher as 'fluent' in English outperformed monolingual children across statutory school exams from primary level SATs to secondary level GCSEs (Demie, 2018). However, when combined into a single category, EAL children underperform on state exams, (carried out in English) respective to monolinguals of the same age, with children who had the weakest language skills performing the poorest (Demie & Strand, 2006; Hutchinson, 2018; Strand & Demie, 2005; Strand et al., 2015).

It is well established in the literature that EAL children have a smaller English vocabulary than their monolingual peers (Bialystok, Craik, Green, & Gollan, 2009; Mahon & Crutchley, 2006; Oller & Eilers, 2002; Portocarrero, Burright, & Donovick, 2007). Common models of reading comprehension, such as the Simple View of

Reading, (SRR; Gough & Tunmer, 1986) and the Reading Rope Model (RRM; Scarborough, 2001) would predict that EAL children, who tend to have a less knowledge about second language structure more generally (e.g. Trapman, van Gelderen, van Steensel, van Schooten, & Hulstijn, 2014), may have compromised reading comprehension, as a result of a smaller English vocabulary.

1.3.1 The Simple View of Reading

According to the Simple View of Reading (SVR) (Gough & Tunmer, 1986), the skill of reading can be split into two fundamental domains, decoding and language comprehension skills (Tunmer & Hoover, 1993) (see Figure 1). Difficulties in either of these domains may lead to difficulty with reading comprehension, both for EAL and ML children.

In essence, if a reader is unable to decode, they will be unable to access written words to understand them. Equally, even if the reader has functional decoding skills, without adequate language knowledge, such as vocabulary, they will not be able to comprehend what has been read.

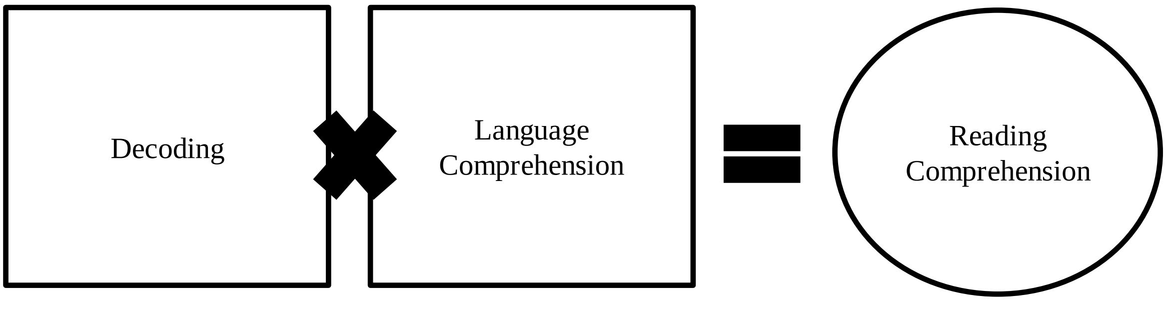

Figure 1 *The Simple View of Reading (Gough & Tunmer, 1986)*

1.3.2 The Reading Rope Model

Scarborough's (2001) Reading Rope Model (RRM) also highlights the importance of vocabulary for successful reading comprehension. This model, similar to the SVR, postulates that reading comprehension is akin to two strands of a rope, language comprehension (similar to the comprehension element of the SVR) and word recognition (similar to decoding cited in the SVR). However, Scarborough expands these elements into various subskills (see Figure 2). Language comprehension is formed by the subskills of background knowledge, vocabulary, language structure knowledge, verbal reasoning and literacy knowledge. The word recognition strand is formed of phonological awareness, decoding and sight recognition. These subskills of language comprehension and word recognition unify, leading to skilled reading. The more skilled the reader becomes, the better these subskills work together.

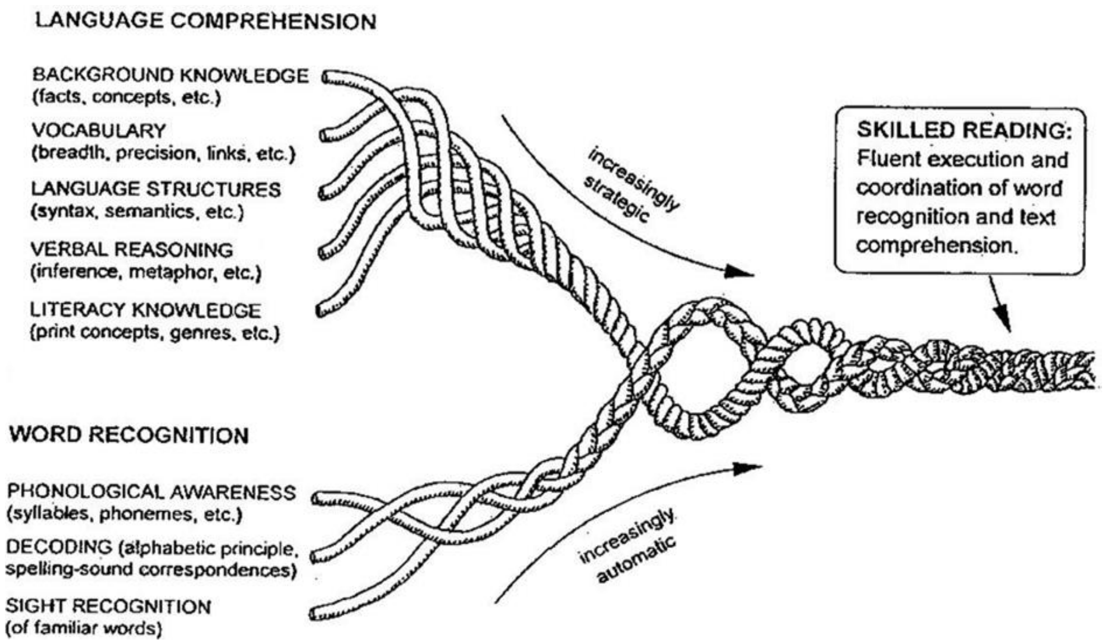

Figure 2 *The Reading Rope Model (Scarborough, 2001)*

Where the SVR and the RRM agree, is that successful reading comprehension is dependent on a multitude of factors, including decoding and vocabulary knowledge. Studies regarding EAL children have found corroborating evidence for the SVR and the

RRM, with second language word reading and listening comprehension ability predicting reading comprehension (Erdos, Genesee, Savage, & Haigh, 2014; Geva & Farnia, 2012; Gottardo & Mueller, 2009; Mancilla-Martinez & Lesaux, 2010).

1.3.3 The reading profile of EAL children

EAL children and MLs typically perform equally well at single word reading (e.g. Hutchinson, Whiteley, Smith & Connors, 2002; Jean & Geva, 2009; Lesaux, Geva, Koda, Siegel & Shanahan, 2008; Lesaux, Rupp, & Siegel, 2007; Lipka & Siegel, 2007; Verhoeven, 1990; 2000) or better than ML children (Bialystok, Luk & Kwan, 2005; Mumtaz & Humphreys, 2002). For example, a large scale meta-analysis of research carrier out in a range of countries (including the UK) found comparable word reading and phonological skills between monolingual and bilingual children (Lesaux et al., 2008). Likewise, Hutchinson et al., (2003), during a two-year longitudinal study in the UK, found no differences on word reading skills between EAL and ML children matched on age, gender and non-verbal intelligence.

Children with EAL in the USA with Spanish as their first language were also found to have age-appropriate decoding skills. This was also found with EAL learners in Canada, from both high and low SES backgrounds (Jean & Geva, 2009; Lesaux et al., 2008; Lesaux, Rupp, & Siegel, 2007; Lipka & Siegel, 2007). Similar findings exist for children learning Dutch from a variety of first languages (Verhoeven, 1990; 2000). There is evidence that decoding skills are enhanced in bilingual children, (Bialystok et al., 2005; Mumtaz & Humphreys, 2002), especially if the bilingual children are learning to read in two alphabetic systems (Bialystok et al., 2005). This trend suggests that bilingual children, who are learning to read in the societal language, do not tend to have difficulties decoding.

Language comprehension skills, on the other hand, seem more of a challenge for bilingual children (including those with EAL). Oral language skills are critical for reading comprehension for monolingual children (e.g. Nation, Clarke, Marshall, & Durand, 2004). Although the literature concerning predictors of reading comprehension skills for EAL children is only emerging, there is tendency that oral language skills, including syntactic knowledge and vocabulary, predict reading comprehension for EAL children (Babayiğit, 2014, 2015; Lesaux, Crosson, Kieffer, & Pierce, 2010; Proctor, Carlo, August, & Snow, 2005).

Vocabulary knowledge has a direct influence upon reading comprehension, based on the principle that the richer the vocabulary, the quicker lexical retrieval can occur which in turn will influence reading comprehension (Daneman, 1988; Perfetti, 1994). Since many studies have found that EAL children tend to have smaller English vocabularies than their monolingual peers (Mahon & Crutchley, 2006; Oller & Eilers, 2002; Portocarrero et al., 2007), this can hinder reading ability and overall success at school (Hutchinson et al., 2003). For example, Babayiğit, (2014) investigated the difference between EAL and ML children across domains of vocabulary, listening and reading comprehension. A gap in skills was found, with EAL children underperforming in comparison to MLs across domains of listening and reading comprehension, as well as oral language, including vocabulary. According to the Lexical Quality Hypothesis (Perfetti, 2007; Perfetti, 1985) reading comprehension is affected by well-established lexical representations. Vocabulary knowledge is consequently a significant predictor of reading comprehension and empirical studies in both monolingual and EAL children have found a reciprocal relationship between reading skill and vocabulary knowledge (Beck, McKeown, & Kucan, 2013; Nation, 2001; Qian, 1999; Qian, 2002; Stahl & Fairbanks, 1986).

1.4 Factors affecting vocabulary acquisition

Vocabulary acquisition is a complex mechanism, in which children must learn both the phonology and semantics of a new lexeme, which are learned gradually and then connected to previous knowledge.

1.4.1 The Word Spurt

In infancy, children undergo a rapid expansion to their vocabulary, known as the 'word spurt' with young children relying upon a variety of strategies to learn new words (Bloom, 2000). Although there are many different ways of estimating vocabulary size, estimates of vocabulary growth in the early years of schooling range between 2000-3600 words a year (Graves, 1986; Nagy & Anderson, 1984). Conservative estimates predict that an average, monolingual five year old will have a vocabulary of around between 4000-5000 word families (Nation & Waring, 1997). A word family refers to a base word, along with inflections, and some derived, regular forms of that word (Bauer & Nation, 1993).

1.4.2 Fast Mapping

Prior to schooling, incidental exposure through "fast mapping" (Carey & Bartlett, 1978) is thought to be the more likely cause of the vocabulary spurt (Behrend, Scofield, & Kleinknecht, 2001). Fast mapping, a term coined by Carey and Bartlett (1978), is a hypothesised lexical process, in which children are able to quickly build a lexical representation of a new word, after minimal exposures to a new word/object pairing. In fact, studies of word learning in infants between the ages of two and three found that labels were learned after mere seconds of exposure to a word with its associated object (Spiegel & Halberda, 2011; Vlach & Sandhofer, 2012). After this exposure, however, slow mapping takes place, whereby, with repeated exposures, more robust representations of the word are incrementally built (Curtis, 1987; Nagy & Herman, 1987). This is in-line with the dual systems approach to word learning, which may account for performance differences in implicit and explicit word learning (Henderson, Powell, Gaskell, & Norbury, 2014).

1.4.3 **The Complementary Learning System**

The Complementary Learning Systems (CLS) account of memory (McClelland, 2013; McClelland, McNaughton, & O'Reilly, 1995) features two separate memory systems which are responsible for different representations; context-specific representations, known as episodes, and knowledge that requires generalisation away from the context in which it was learned (semantic representations). The neocortical memory features overlapping representations which can spread activation from incoming information. The hippocampal system includes more sparse representations that are specific to the learning context and are stored away from other memory representations. From the hippocampal system, information can become incorporated into the neocortex over time through rehearsal, re-experience or sleep.

Davis and Gaskell (2009) suggested that the CLS framework could be applied to the acquisition of vocabulary. According to this framework, the first encounter with a new word engages multiple cortical regions used for the processing of speech. The new word is encoded into an 'episodic' memory, which is not connected to the existing lexicon.

The novel word then becomes a stable representation in the medial temporal lobe, in which the hippocampus is situated. In order to retrieve the semantic and phonological form of the lexical entry, hippocampal mediation is required (Davis & Gaskell, 2009). Over time, the novel entry becomes a stable, cortical representation in the neocortical recognition system. This can be enhanced through sleep. Therefore, there are two layers of word learning, an episodic representation that happens upon first exposure, and a lexical representation after multiple repetitions (Davis & Gaskell, 2009).

Fast acquisition of the phonological form of a new word occurs in the first instance, in which storage occurs in the medial temporal and hippocampal areas. Slower, long term acquisition occurs in the neocortex, in which previously acquired information is stored, offline, often during sleep (Davis & Gaskell, 2009). How to examine whether a word has been effectively acquired, however, is problematic for researchers. A fundamental question is how to quantify when or if a word is known (McMurray, Horst, & Samuelson, 2012).

1.4.4 **The Mutual Exclusivity Constraint**

As an alternative to quantifying word learning, we can investigate how children learn to use words. If a word is used correctly, we can assume it has been efficiently learnt and stored. One way to investigate this is through examining the mutual exclusivity constraint to word learning (Markman & Wachtel, 1988; Markman, Wasow, & Hansen, 2003). When children are acquiring vocabulary rapidly, they are required to quickly and efficiently eliminate possible meanings for new words they encounter. One plausible explanation for how this is done is the assumption that labels are mutually exclusive. Markman and Wachtel (1988) found that three-year old monolingual children will reject a new label for an object if they have a pre-existing label in their established lexicon. Instead, they treat the novel label as belonging to a new object.

Itt may be that bilingual children, who are adept at having two or more labels for a single referent, do not adhere to the principles of mutual exclusivity (Davidson, Jergovic, Imami, & Theodos, 1997; Davidson & Tell, 2005). For example, Byers-Heinlein and Werker, (2009) found that 17-18 month old monolingual infants effectively applied the mutual exclusivity constraint to novel words, however infants with knowledge of two languages used it only marginally, and those with three languages did not use it at all. This suggests that language knowledge and experience can alter the way that children acquire vocabulary.

However, it is uncertain whether mutual exclusivity can lead to long term word learning. For example, Horst and Samuelson (2008), showed children three objects, two of which were known and one was novel. Children were then asked to present the researchers with the referring expression of the novel object. Using mutual exclusivity, children were able to correctly infer that the novel referring expression referred to the novel object. However, five minutes later, they were unable to map the referring expression to the object, when they were presented with additional novel objects. Consequently, it is unclear if mutual exclusivity can lead to longer term word learning, however, it clearly identifies that exposure to more than one language in early childhood can alter the ways in which children establish lexical representations.

1.5 Teaching vocabulary to children

Two main routes for vocabulary acquisition have been proposed by language researchers, via incidental learning, i.e. learning vocabulary without explicit intention while carrying out some other form of language related exercise such as reading or conversation, and through explicit instruction, i.e. learning new words when the focus of the exercise is the task of learning.

A key way that has been found to enhance vocabulary knowledge for both EAL and ML children, is explicit instruction (Murphy & Unthiah, 2015; Oxley & de Cat, 2019). Explicit instruction involves training to convey the meaning of unknown items, and can include the use of key words, mnemonics, synonyms, or classifying and defining newly encountered vocabulary items (Stahl & Fairbanks, 1986).

Research carried out on monolingual, English speaking children has found that explicit instruction using word learning strategies, such as giving definitions, or highlighting contextual information about word meanings, is effective at enhancing vocabulary knowledge (Beck & McKeown, 2001; Beck et al., 2013; Stahl, 1999). This can be improved further when explicit instruction is integrated into the existing curriculum at school (Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003), providing children ample opportunities to review their knowledge over time, building stronger representations in the lexicon (Baker, Simmons, & Kame'enui, 1998).

Although explicit instruction does prove beneficial for vocabulary learning (Beck & McKeown, 2001; Beck et al., 2013; Stahl, 1999), it cannot account for all of the vocabulary that children acquire (Nagy & Herman, 1987). Vocabulary can also be learned incidentally, without explicit instruction (Eller, Pappas, & Brown, 1988; Horst, 2005; Jenkins, Stein, & Wysocki, 1984; Nagy, Anderson, & Herman, 1987; Nagy, Herman, & Anderson, 1985; Pigada & Schmitt, 2006; Waring & Takaki, 2003; Robbins & Ehri, 1994; Sénéchal & Cornell, 1993).

Before the onset of formal schooling, children acquire most of their vocabularies incidentally through verbal contexts (Becker, 1977; Justice, Meier, & Walpole, 2005). However, for monolingual children, by school age, oral language is less effective at augmenting a child's vocabulary. Spoken conversations often do not go further than common words, therefore children are not exposed to richer vocabulary items (Cunningham & Stanovich, 1998; Hayes & Ahrens, 1988). Likewise, the books that children read at school onset are ill-equipped to develop a child's vocabulary as they are focused on words which are easier to decode and are common to children's oral lexicon (Beck & McKeown, 2007). However, for children with EAL, school onset may be their first exposure to English, therefore they will be expected to learn literacy skills such as decoding, at the same time as acquiring basic vocabulary.

Research into incidental learning has provided evidence that exposure to texts can contribute to vocabulary growth in both first and second language acquisition. However, there is still little understanding of how effective incidental learning is compared to other methods, such as direct instruction (Coady & Huckin, 1997; Horst & Meara, 1999; Huckin & Coady, 1999; Nagy et al., 1985; Nation & Coady, 1988; Waring & Takaki, 2003; Raptis, 1997). For monolingual speakers, incidental learning is the main route of vocabulary acquisition (e.g. Nagy, 1997). For second language learners, studies with both child and adult bilinguals have revealed that there are limits to the extent of vocabulary that can be acquired, with very small vocabulary gains, just above chance (e.g. Pitts et al., 1989; Day et al., 1991; Dupuy & Krashen, 1993; Hulstijn, 1992; Horst, Cobb & Meara 1998; Uchikoshi, 2006; Waring & Takaki, 2003).

For example, Uchikoshi (2006) compared five and six year old EAL children's ability to incidentally acquire vocabulary from television programmes. Although children did increase their vocabulary size on a pre to post-test measure, there were no differences in vocabulary gains in the intervention group to a control group who carried out normal school activities. Furthermore, some studies investigating incidental learning (Day, Omura, & Hiramatsu, 1991; Pitts, White, & Krashen, 1989) have been criticised for having a number of limitations (e.g. Hunt & Beglar, 2005). Nation (2001) argues that incidental learning experiments have not used measurements of vocabulary growth that are sensitive enough to the small increments of learning that are often displayed. Additionally, such experiments do not often control for text difficulty and learners may not be able to complete the tasks (Nation, 2001). To control for this, Horst, (2005) measured adult second language learner's ability to implicitly learn new vocabulary items encountered in simplified texts, in topic areas that the learners chose themselves. The results suggested that learners made larger gains than those previously reported in similar studies (e.g. Day et al., 1991; Pitts et al., 1989), with participants appearing to learn more than half of the newly encountered vocabulary items. However, this study focused upon real word learning in pre-existing books, with results based upon participants self-reports of how well they knew the vocabulary content. Consequently, the results are not as reliable as the more common pre- to post-test gains often seen in vocabulary acquisition studies, and it the extent to which participants had pre-existing knowledge of the vocabulary items is unknown.

1.5.1 Summary: Teaching vocabulary to children

In sum, evidence conveys that vocabulary can be learned incidentally from reading, or while listening to stories, however, gaps in the literature still persist. While linguistic studies of explicit and implicit second language acquisition give us some insight into the potential learning gains that can be made through instruction and incidental contact, more rigorous experiments are needed to verify these results.

Evidence from experimental studies may provide more robust evidence of vocabulary gains that can be made for both bilingual and monolingual participants.

1.6 Evidence of language acquisition from experimental studies

Experimental studies of language provide opportunity to investigate acquisition under strict and controlled conditions, which often are not possible in classroom-based interventions. Whereas classroom-based vocabulary interventions cannot control for pre-exposure to treatment vocabulary, experimental studies using novel words provide an equal starting point for all participants, including those who have had limited exposure to English. Therefore, experimental studies can provide a robust evidence base for true word learning across participants with varying exposure to English.

Evidence from experimental studies has found a novel word learning advantage (or facilitation effect) across bilingual adults and children compared to monolinguals (Kaushanskaya & Marian, 2009b; Papagno & Vallar, 1995; Van Hell & Mahn, 1997). However, it is unclear what is driving such an effect. Previous studies documenting the bilingual advantage in terms of cognition suggest bilinguals have more experience of inhibitory control (i.e. supressing one language while activating the other), which results in a strengthening of executive control, a mechanism which is used in complex cognitive processes such as attention, inhibition and monitoring (see Bialystok, 2009, for a review). However, a recent large-scale study in the USA, using a large (n= 4524), nationally representative sample of children aged 9-10 years, found no advantage in executive function for bilingual children (Dick et al., 2019). Therefore, evidence is mixed as to whether a bilingual advantage in executive control could be facilitating a bilingual novel word learning advantage.

1.7 Word learning in bilinguals

1.7.1 Studies of real word learning in bilinguals

Research into novel word learning in bilinguals is underpinned by work in the 1990s by Papagno and Vallar (1995) and Van Hell & Mahn, (1997). Both studies tested bilingual and monolinguals' abilities to learn real words in unfamiliar, foreign languages. Papagno & Vallar (1995) tested Italian mono- and bilingual adults' ability to learn unknown Russian vocabulary items, alongside measures of phonological and visuo-spatial short and long-term memory, as well as intelligence measures, and baseline L1 vocabulary size. Phonological short-term memory advantages were found in experienced language learners, suggesting the bilingual advantage in word learning studies could be the result of a phonological advantage, or a more efficient phonological memory. Similarly, Van Hell and Mahn (1997) found Dutch native speakers who had knowledge of an additional language outperformed monolingual American participants across both a 'rote rehearsal' method of word learning and a 'Keyword mnemonics' method. Experienced learners were able to recall more words across both methods and were faster to retrieve the learned words from memory.

1.7.2 Studies of novel word learning in bilinguals

More recently, experimental work has focused upon synthetic novel words, created and manipulated by researchers (Kaushanskaya, 2012; Kaushanskaya, Gross, & Buac, 2014; Kaushanskaya & Marian, 2009a, 2009b; Kaushanskaya & Rechtzigel, 2012; Nair, Biedermann, & Nickels, 2016).

Nair, Biedermann, and Nickels (2016) investigated whether amount of language exposure influenced novel word learning ability. This was studied with early and late bilinguals, in comparison to monolinguals. Enhanced novel word learning was found in all bilinguals over monolinguals, even those who had limited exposure to their second language. This would suggest that even input to a second language later in life can enhance word learning ability. The authors then carried out a regression analysis looking at length of language exposure and its influence upon novel word learning ability. In this regression, early bilinguals did outperform late bilinguals, suggesting the greater the second language exposure, the better its facilitation effect on word learning.

Kaushanskaya (2012) conducted two experiments of synthetic word learning. In experiment one, English native speaking adults were taught phonologically familiar novel words built using English phonemes, such as ‘tuf’ and ‘funɑ’. In experiment two, participants learned phonologically-unfamiliar novel words that included non-English phonemes, such as ‘t̪yf’ and ‘fynɑ’. In each experiment, bilingual adults were contrasted with two groups of monolingual adults. Monolingual adult groups consisted of a high memory-span monolingual group (whom were matched to the bilinguals on phonological memory performance) and a low-span monolingual group. Across both experiments, bilingual participants outperformed monolingual participants, including those who were initially matched on performance of phonological memory. High-span monolinguals outperformed low-span monolinguals when learning phonologically-unfamiliar novel words, but not when learning phonologically-familiar novel words. The findings suggest that the bilingual advantage for novel word learning is not conditional to the phonological properties of novel words, and that phonological memory capacity as measured here cannot account for the bilingual effects on learning.

Kaushanskaya and Marian (2009a) also studied the acquisition of novel items which were not phonologically word-like in English, but were orthographically viable in English. For example, the orthographic representation of bucket was ‘funa’, which was presented phonetically as /yf/. Their aim was to study whether bilingualism facilitated adults’ capabilities to resolve such inconsistencies during word learning. English speaking monolinguals and English-Spanish bilinguals were taught novel words which were not phonotactically viable in English but did follow English orthographical patterns. Results of the study indicated that, for monolingual participants, when native-language orthographic information was presented during learning, it interfered with the participant’s ability to encode novel words. However, this was not the case in bilinguals, who generally outperformed monolinguals across the word-learning task. The authors indicated that knowledge of more than one language may be a facilitating factor during word learning and could stop interference with cross-linguistic inconsistencies in orthographic to phonological mappings.

In a similar study by the same authors (Kaushanskaya & Marian, 2009b), the influence of bilingualism on novel word learning was investigated, however, among participants with differing language backgrounds. Monolingual English speakers, English- Spanish bilinguals and early onset English-Mandarin bilinguals were taught novel words which were phonologically unfamiliar. All novel words were taught with an English translation. Monolinguals were outperformed by both groups of bilingual participants on measures of word learning. The authors concluded that bilingualism can facilitate a word-learning performance in adults, even when the adults speak differing languages and bilingual exposure. Overall, a bilingual advantage for novel word learning was found.

Kaushanskaya and Rechtzigel (2012) sought to investigate semantic knowledge of novel words in bilingual and monolingual adults. All adults were taught novel items with which the concreteness of the referent had been manipulated, as concreteness of words have been found to more strongly activate the semantic system than abstract words. A bilingual advantage was found over monolinguals, suggesting that semantic information does play a part in the bilingual word learning advantage, which the authors attribute to participant's greater sensitivity to semantic information during learning. Additionally, the bilingual advantage was stronger when the novel words were concrete concepts rather than abstract. This would suggest that bilingual word learning advantages may emerge when the linked semantic confirmation associated with the novel word is more accessible. The authors attribute this to bilinguals having a more interactive semantic system, through exposure to two languages. This therefore creates enhanced semantic activation due to the availability of two languages, which creates a stronger lexical-semantic link compared to monolinguals.

Kaushanskaya, Yoo, and Van Hecke (2013) looked at the effects of phonological and referent familiarity on novel word learning in adults with experience of learning another language. English native speakers with varying experience of Spanish were taught either novel words which were phonotactically viable in English (e.g. /dɪsɑt/) or were constructed using unfamiliar sounds in both Spanish and English (e.g. /dεʐyʈ/). Each novel word was taught alongside either a familiar (animal) or unfamiliar (alien) referent. Results were assessed through a forced choice recognition task. They revealed that the ability to accurately pair novel words to the correct referents is facilitated by phonological familiarity in the case of familiar referents. For unfamiliar referents, this was not the case. Furthermore, greater experience of learning Spanish produced better word learners in the condition with which phonologically-unfamiliar novel words were paired with familiar referents. This would indicate that phonological familiarity to languages of which participants had knowledge did enhance word learning ability, but only when the referents were familiar.

Little, however, is known about whether such a bilingual advantage of novel word learning will extend to children. Kaushanskaya et al. (2014) compared monolingual English-speaking children and English as a first language children who had been in a Spanish immersion classroom for two years on measures of novel word learning. Groups were matched on measures of non-linguistic task-shifting and verbal short-term memory, however, the children with knowledge of more than one language outperformed monolinguals on both verbal working memory and word learning. Constraints to word learning were found. Bilinguals outperformed monolinguals when referents were familiar objects, in this case animals. When referents were novel (aliens), both mono- and bilinguals performed identically. This suggests that that bilingual advantage of word learning documented in experimental studies of both children and adults, may be constrained to lexical acquisition, rather than advantages based around superior verbal memory systems, such as a phonological advantage. The advantage that has been documented could be related to the bilingual's experience acquiring their second language. Second language acquisition requires the mapping of novel labels to already known concepts, a process which bilinguals will be familiar with and therefore may hold an advantage over monolinguals.

1.7.3 Summary: Novel word learning in bilinguals

Knowledge of more than one language has been shown to facilitate novel word learning in bilingual adults in comparison to monolingual adults. These advantages seem to derive mainly from phonology (e.g. Kaushanskaya et al., 2013) but advantages can also be seen in terms of semantic learning (e.g. Kaushanskaya & Rechtzigel, 2012). This advantage has also been found in bilingual children (Kaushanskaya et al., 2014), however only when referents were known rather than unknown. While we know that word learning involves the encoding of both the phonological form of the new item as well as its semantic representation, word learning experiments with bilinguals typically use a paradigm of paired associates. For example, the participants' ability to retrieve translations to show learning (e.g. Kaushanskaya & Marian, 2009; Van Hell & Mahn, 1997), which could perhaps suggest a lexical retrieval advantage rather than a phonological advantage of learning. Paired associate learning can assess either receptive or expressive vocabulary knowledge (Steinel, Hulstjin & Steinel, 2007), however many word learning experiments do not require free recall of novel items (e.g. Alt, Plante & Creusere., 2004; Alt & Plante, 2006 ; Gordon & McGregor, 2014; Kaushanskaya & Marian 2009; Kaushanskaya, et al., 2012, Weismer & Hesketh, 1996, 1998) which may not give a fully representative picture of learning.

Measuring the extent to which words have been consolidated into the lexicon is difficult for researchers and requires consideration of the population being tested before implementation.

1.8 Measuring vocabulary knowledge

Vocabulary knowledge has been shown to be one of the best predictors of reading comprehension, both for monolinguals and bilinguals (Farnia & Geva, 2011; Koda, 2005; Laufer, 1992; Nation, 2001; Read, 2000). However, the nature of what encompasses vocabulary knowledge is still unclear. Anderson and Freebody (1981) argue that knowledge of vocabulary sits between two domains; vocabulary breadth and vocabulary depth. Vocabulary breadth accounts for the number of words a person knows at least in part, whereas vocabulary depth involves the quality or depth of the understanding of those words.

Vocabulary depth is sometimes regarded as how well one can link a word’s meaning to other words in the lexicon (Haastrup & Henriksen, 2000; Qian, 1999, 2002). Following this, vocabulary depth could be defined as how well lexical networks have been formed in the mind. Other research would argue that knowledge of morphology is intrinsic to vocabulary depth (Bowers, Kirby, & Deacon, 2010; Kieffer & Lesaux, 2008; Perfetti, 2007; Qian, 1999). For example, if a child can understand about affixes or suffixes of words, they can benefit from a deeper knowledge of word formations and meanings. Morphology can then integrate both the semantic, orthographic and phonological aspects of the words (Bowers et al., 2010; Kieffer & Lesaux, 2008; Perfetti, 2007; Qian, 1999). Nurweni and Read (1999) suggested that vocabulary depth and breadth may be highly related when learners are advanced, but when levels of language proficiency are lower, the two dimensions of vocabulary are more separable. When developing language, learners recognise a small number of words and their meanings in the most basic form. Learners acquire more and more words at this level, increasing their vocabulary breadth. When language proficiency increases, the learner is able to use more information to define these words, and can link them to words in other contexts, which in turn, supports the ability to learn vocabulary (Haastrup & Henriksen, 2000; Ma, 2009; Perfetti, 2007). Vocabulary depth and breadth are therefore reciprocal. Vocabulary breadth and vocabulary depth can predict different aspects of reading ability and comprehension. Vocabulary breadth measures can predict decoding and word recognition ability, whereas vocabulary depth can be predictive of reading comprehension (Ouellette, 2006), particularly the skill of being able to extract meaning while reading (Oakhill & Cain, 2012).

Vocabulary breadth can be measured through receptive vocabulary tasks. Receptive vocabulary is generally measured through forced choice tasks, such as the British Picture Vocabulary Scale (BPVS-III; Dunn, Dunn, & Styles, 2009) or its American counterpart, the Peabody Picture Vocabulary Scale (Dunn & Dunn, 1981). During this type of assessment, a child hears a word read aloud by the researcher, and selects a picture from a choice. Receptive vocabulary tasks paint a general picture of a child's word knowledge, comparative to their aged matched peers, however they tend to be based on sparser representations than expressive tasks, and may be the result of chance. Furthermore, knowledge of a word often is on a continuum, and is not a binary category. For example, Vermeer (2001) supposes that if a child is asked to point to an image of a tulip, but instead points to a picture of a rose, to what extent is their answer incorrect? The child is aware that a tulip is belongs to a semantic category of flower, therefore has some knowledge of the word.

Expressive tasks, on the other hand, tap into vocabulary depth. Expressive tasks rely on deeper word knowledge with more concrete representations and usually are one of two tasks. In task one, a child is shown a picture and has to name it, such as the expressive vocabulary subset of the Clinical Evaluation of Language Fundamentals (CELF-IV; Semel, Wiig, & Secord, 2003). In task two, the child is asked to define a picture or a term read aloud to them, such as the vocabulary definitions task on the Wechsler Abbreviated Scale of Intelligence, (WASI-II; Wechsler, 2011). Both tests require a varying amount of information to be retrieved. Arguably, providing a definition for a vocabulary item requires the most concrete representation, however, it also requires a large enough baseline vocabulary to be able to adequately define a word. This could be problematic for children with EAL, who often have a smaller English vocabulary than their monolingual peers. Consequently, expressive naming may be a more accurate test of expressive vocabulary for children with EAL.

1.9 General Summary

1.9.1 Aims and overview of the thesis

In England, more than one in five children in primary schools speak English as an additional language (Department for Education, 2018), and (some) EAL children underperform across national exams from primary into secondary schools, with children who have the weakest English language skills performing the poorest (Strand & Hessel, 2018). Most of the examinations in the UK include vast amounts of reading comprehension, and fewer EAL children make expected progress in reading than MLs.

According to the simple view of reading (Gough & Tumner, 1986), reading comprehension is supported by decoding skills and oral language skills, the latter being underpinned by vocabulary knowledge. EAL children on the whole have a smaller English vocabulary than their ML peers. Evidence suggests that once gaps in vocabulary appear, they persist throughout school (Biemiller, 2001; Hart & Risley, 1995; Juel, Biancarosa, & Coker, 2003). A lack of vocabulary has consequences on children's literacy growth, it is therefore considered imperative that schools focus on vocabulary from the early years of school (Biemiller & Slonim, 2001; Coyne, Simmons, Kame'enui, & Stoolmiller, 2004). Yet, little is known about the best ways to teach vocabulary to children with EAL. Although an emerging literature suggests that EAL children may benefit from explicit instruction of vocabulary (Murphy & Unthiah, 2015; Oxley & de Cat, 2019), there are few studies originating from the UK, therefore it is difficult to know if findings would be transferable. Likewise, experimental word learning studies have found an advantage for bilingual adults, especially in terms of phonology, however, little evidence exists examining experimental novel word learning in bilingual children. Consequently, it is difficult to predict whether such an advantage would exist for children with EAL. This thesis aims to address these gaps in the literature.

1.9.2 **Thesis aim**

The overarching aims of this thesis were to investigate the ways in which children with EAL learn vocabulary and whether there could be recommendations for future practice as a result.

Our first aim was to identify existing interventions with evidence of vocabulary gains for children with EAL. Most of the research in this domain is from the USA, where the EAL demographic is less heterogeneous than in the UK. Many EAL children in the USA speak Spanish as their first language, and interventions reflect this, using Spanish/English cognates or translation strategies. Consequently, we were interested to see if interventions may be replicable in UK classrooms.

Our main aim was to investigate whether explicit or implicit training of vocabulary would benefit children with EAL, and whether ability to learn novel words was reflected in English vocabulary growth over time. A secondary aim was to see how the importance of vocabulary aligned with practitioners' views of strategies for EAL children. Specifically, do practitioners regard vocabulary as an important indicator of academic attainment for EAL children, or do they see other factors as more pivotal to EAL achievement. There have been a number of studies which have identified bilinguals as having an advantage in domains such as word learning and memory. Little is known, however, about how children with EAL, who have a different demographic to the bilinguals identified in novel word learning studies, will fair in experimental studies. With this in mind, we sought to investigate vocabulary acquisition within a population of children who speak English as an additional language, compared to children who spoke English only.

The aims of the thesis were:

1) To identify language interventions from the literature with robust evidence to improve the English vocabulary of children with English as an additional language.
2) To investigate whether strategies to improve the English vocabulary of EAL children were replicable in UK classrooms.
3) To identify if there was a difference between monolingual and EAL children's ability to learn vocabulary using strategies identified.
4) To identify whether children's ability to learn vocabulary through the strategies predict English vocabulary growth.
5) To investigate whether the strategies identified through the systematic review and empirical studies reflected current practice in UK classrooms, or whether teachers prioritised different learning methods when teaching EAL children.

1.9.3 **Research strategy**

A systematic review was carried out to identify vocabulary learning intervention techniques which had proven results for children under twelve years of age who spoke English as an additional language. Of the 23 studies which were eligible for the review, there were a number of commonalities for strategies with word learning gains. These included: explicit instruction of new word forms; embedded definitions of new word forms in texts; adult led, dialogic reading; computer assisted vocabulary instruction; continued professional development for teachers; family literacy programmes and implicit vocabulary interventions. The most significant intervention technique with the largest effect sizes was explicit instruction of new word forms. When these intervention techniques were compared to dialogic reading comparator groups within the same interventions, explicit instruction provided the largest vocabulary gains. Twenty-two of the 23 intervention studies took places in the USA. The aim of this research was to replicate the most significant intervention techniques in an experimental setting, to gain insight into whether such intervention techniques would prove fruitful for children in classrooms in the UK. Three experiments were devised. In experiment one, children were explicitly taught six novel words over two trials. The second experiment introduced children to the novel words via a recorded story with no explicit instruction. The third study investigated the relationship between children's abilities to learn novel words, and their vocabulary growth over twelve months.

1.9.4 **Research technique**

The first study was an independent samples design with four schools and a total of 119 children, of whom 67 spoke English as an additional language. Both groups (EALs and monolinguals) carried out explicit word learning procedures via a laptop. The second study involved two schools with a total of 80 children, of whom 50 spoke English as an additional language. Children listened to two recorded stories via headphones with six novel words embedded within the narrative. In both studies one and two, children were tested on their recall and recognition of labels immediately and one-week post-test. Baseline assessment measures used for study one and two were the Clinical Evaluation of Language Fundamentals IV expressive vocabulary subtest (Semel, Wiig & Secord, 2003); the British Picture Vocabulary Scale III (Dunn et al., 2009); the Children's Test of Nonword Repetition (Gathercole & Baddeley, 1996) and the Wechsler Abbreviated Scale of Intelligence II matrix reasoning subtest (Wechsler, 2011). The third study was a longitudinal follow up of the children who took part in study one. Children were re-administered the baseline measures of expressive and receptive vocabulary from study one, in order to investigate their English language vocabulary growth over twelve months. Additional data was collected about the language exposure and preferences of the EAL children via an oral questionnaire which was carried out with a researcher.

1.9.5 **Outline of chapters**

Chapter one discusses the evidence surrounding bilingual learners and how this may impact on word learning ability. Chapter two presents evidence of word learning interventions for children with EAL presented through a systematic review. Chapter three presents the broad methodology for the experimental studies. In chapters four, five and six, specific background, methodology, results and analysis are provided for the experimental procedures carried out. Chapter seven uses a Delphi technique to analyse practitioners' perspectives on the barriers to attainment for EAL pupils, how they overcome such barriers, and their future wishes. Chapter eight concludes with a discussion of the evidence presented and possible implications for practitioners, policy makers, and future research.

Chapter 2: A systematic review of word learning interventions in primary school children with English as an additional language (EAL)

2.1 Introduction

Vocabulary knowledge in children is closely linked to reading comprehension ability and longer-term school attainment (Verhoeven, Van Leeuwe & Vermeer, 2011). EAL children have a smaller English vocabulary than their monolingual peers during primary school (Mahon & Crutchley, 2006; Murphy, 2014) and those with weaker English language skills perform poorly on national exams (Strand & Hessell, 2018).
This review systematically examines vocabulary interventions in primary school children with EAL.

Four databases were searched: PsychInfo, British Education Index, Web of Science and Educational Resources Information Center. This resulted in 6789 papers to screen and 23 studies were found to be eligible for inclusion in the current review.
The interventions provide evidence that explicit vocabulary training in context can produce word learning gains and those with EAL can learn at the same rate as monolingual peers. Dialogic reading interventions showed word learning gains, especially when definitions and contextual aids were given alongside target items. When interventions were implicit or provided no additional context, children with EAL did not make vocabulary gains. Limitations in the existing literature include a high risk of bias, as well as a paucity of interventions within the UK. Implications for interventions in the UK are discussed.

2.2 Background

In the UK, the number of children in schools designated as EAL has been steadily increasing over the past ten years (DfE & National Statistics, 2008). However, these figures are an average across England, and the national picture of EAL is very diverse. Inner city schools tend to have a higher proportion of EAL pupils, whereas rural coastal schools may not have any EAL pupils recorded (Strand et al., 2015). With the increasing EAL population, the obligation to meet the language needs of pupils falls to already over-stretched schools.

EAL learners as a whole underperform compared to their peers and their attainment varies greatly (Strand et al., 2015), with underperformance shown in reading and writing (Demie, 2018). The heterogeneity of learners defined as having EAL can mask average attainment scores, with those at the early stages of language acquisition disguised by those with full linguistic competence (Demie, 2018).

In addition to the gaps in attainment that EAL children display, England and Scotland hold little provision for initial teacher training (ITT) with regards to EAL pedagogy. For example, EAL pedagogy is not regarded as a subject within its own right on the ITT curriculum (Foley, Sangster, & Anderson, 2013). Consequently newly qualified teachers have consistently rated EAL pedagogy as an areas in which they feel ill-prepared (Pye, Stobart, Lindley, & Mori, 2016). With this in mind, there is a real need to identify interventions which could be effectively implemented in the UK to improve the attainment of children with English as an additional language.

Vocabulary development is critical for everyday learning as children must be able to negotiate language in the classroom, foster relationships with peers, and comprehend texts across a range of subjects both in class and in exams.

Children's knowledge of vocabulary is cumulative (Chall, Jacobs, & Baldwin, 1990). Children who have already well-established semantic knowledge of words are able to access this information quickly, enhancing both comprehension and reading proficiency (Vellutino et al., 1996). Vocabulary knowledge consequently correlates strongly to overall school attainment and reading fluency (Carnine, Kameenui, & Coyle, 1984; Huttenlocher, Haight, Bryk, Seltzer, & et al, 1991; Jenkins, Stein, & Wysocki, 1984; Mezynski, 1983; Scarborough, 2001; Walker, Greenwood, Hart, & Carta, 1994) with far reaching implications to wellbeing in later life (Whiteside, Gooch, & Norbury, 2017).

There is a wealth of evidence that EAL children have a smaller English vocabulary compared to their monolingual peers (e.g. Mahon & Crutchley, 2006; Murphy, 2014; Oller & Eilers, 2002; Portocarrero et al., 2007). Vocabulary knowledge plays a critical role in both language and reading development (Stahl & Nagy, 2006) especially in terms of reading comprehension (Verhoeven et al., 2011). The limited English vocabulary that many EAL children have disrupts their literacy development as unfamiliar words impede comprehension (August, Carlo, Dressler, & Snow, 2005; Longberg, 2012).

While we know that children can learn new vocabulary from reading (e.g. Robbins & Ehri, 1994), EAL children, who are struggling with reading comprehension as a result of their smaller English vocabularies (August et al., 2005; Longberg, 2012), are less well equipped to pick up vocabulary implicitly while reading. In fact, by seven years of age, it is estimated that children with a large vocabulary can know up to double the meanings of root words than their peers with smaller vocabularies (Biemiller, 2009). Biemiller & Boote (2006) suggest that schooling alone fails to close the vocabulary gap, and we cannot rely on children being able to pick up unknown words when reading, in which case, specific, targeted interventions are necessary to ensure that EAL children are not left behind.

2.2.1 Objectives

The first aim of the review was to synthesise current interventions of word learning within the population of EAL. The review sought to investigate which methods of word learning were most effective for EAL children. A second purpose of this study was to investigate whether these intervention sound be replicated in the UK.

Given the current growth of EAL children in the UK, it is timely to critically review word learning interventions for children with EAL.

2.3 Methods

2.3.1 Protocol and registration

This systematic review was conducted to assess word learning interventions in children with EAL. The review follows the PRISMA (2009) checklist and is registered on the PROSPERO database. Registration number CRD42016041993**.**

2.3.2 Information sources and search terms

Searches were conducted using the databases PsychInfo, British Education Index, Web of Science and Educational Resources Information Center. The final search was conducted on the 26th July 2018. Results were added to an Endnote bibliography, where duplicates were removed. A further hand search of bibliographies resulted in the inclusion of two additional studies.

Search terms were decided upon via a PICOS protocol, using an adaptation of the terms used by Low and Beverton (2004). The PICOS method considers the population, intervention type, comparator group, outcome measures and setting. Search terms are developed according to each category. Consequently, the following search terms were devised:

Word learning (OR vocabulary) AND intervention (OR instruction, training, learning, development, teaching) AND children (OR infants) AND English as an additional language (OR ESL, bilingual, second language acquisition).

2.3.3 Eligibility criteria

For the purpose of this review, the population included children with EAL and their monolingual peers. The main focus was on school children between five and twelve years, although papers were included with children as young as four, so long as the mean age of children at the start of intervention was 4;0 or above. The papers chosen were published between 2000 and 2018, peer reviewed and written in English. Studies with less than 50 children in total (equalling less than 25 children in the respective intervention and comparator group) were eliminated as they can be more prone to type two errors, and small sample sizes can reduce statistical power (Næss, Melby-Lervåg, Hulme, & Lyster, 2012). One researcher screened all titles and abstracts. At the same time point, a second researcher screened a sample of 5% of the titles and abstracts. The 5% sample was chosen from the website random.org. Inter-rater agreement was 98% at first screening, and after discussion inter-rater agreement was 100%. At full text screening, 142 texts remained, according to the inclusion criteria shown in Figure 3. At full text screening, a second researcher screened 20% of the full texts, with 100% agreement between raters. Full text screening resulted in 23 articles eligible for data extraction which reported 22 interventions.

Table 1 *Inclusion criteria for studies in the systematic review*

Inclusion Criteria
Must include children between 4 and 12 years
Must include more than 50 participants per intervention
Must include a control or comparator group
Must involve or report on an intervention of word learning with a vocabulary outcome measure
Must collect and report on empirical data
Must analyse progress of EAL learners as a separate variable
Language of instruction must be English
Language of the wider community must be English
Published between 2000 and 2018
Population must not have special educational needs

2.4 Results

After the systematic search, 6789 studies were found from databases with an additional two studies from hand searches. Studies were then saved in an Endnote library for assessment. After the removal of duplicates, 5933 studies remained for title and abstract screening, of which 5790 were found to be unsuitable. One hundred and forty two studies remained for a more in-depth screening of the full text. One hundred and nineteen studies were removed.

Twenty-two interventions (reported in 23 articles) were eligible for inclusion in the review according to the inclusion (table 1). Figure 3 displays the full screening process involved for this review. Following selection, data was extracted for each study.

PRISMA 2009 Flow Diagram

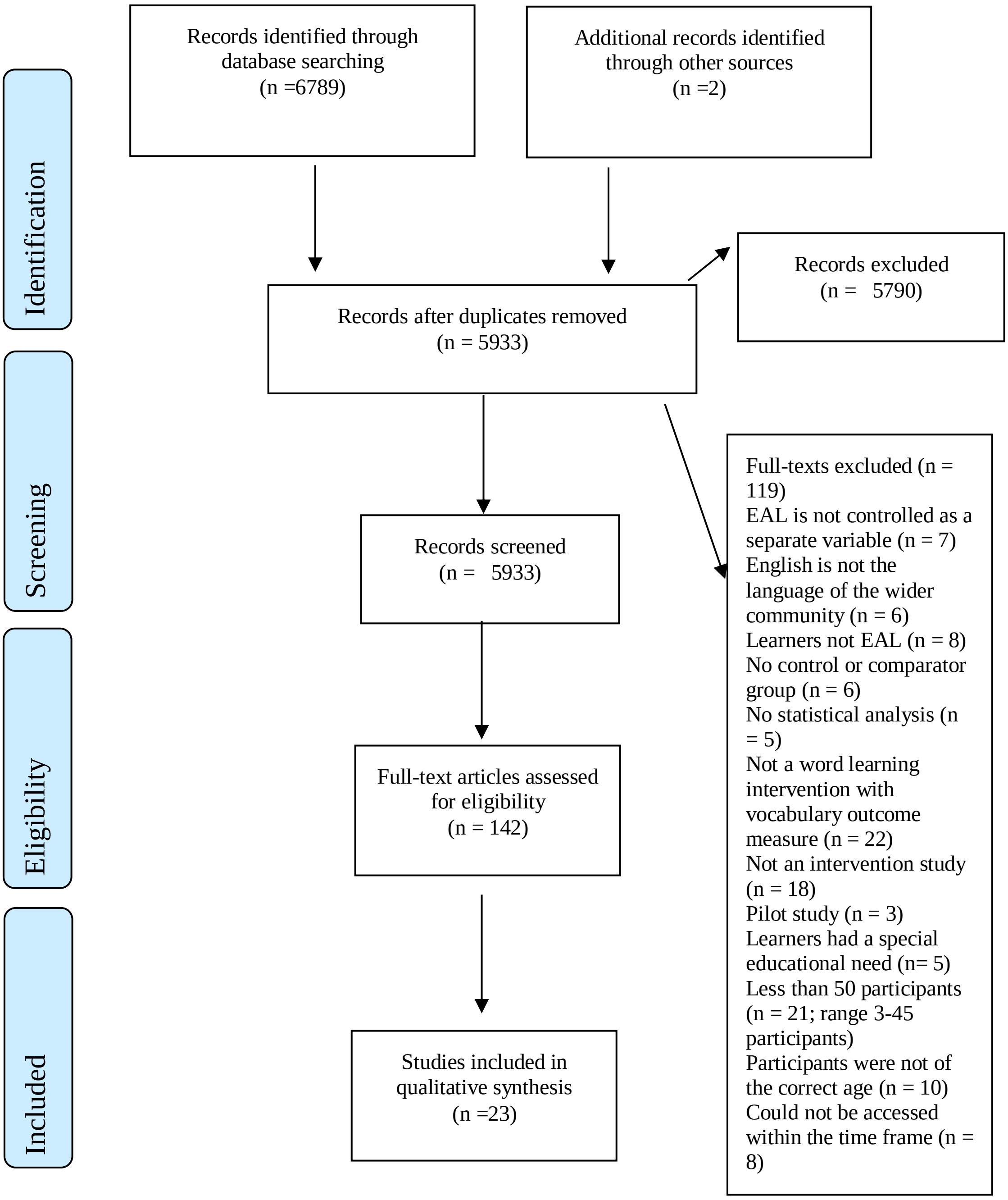

Figure 3 *Prisma flow diagram of screening workload*

2.4.1 **Data extraction**

Data was extracted using an adaptation of the Cochrane data extraction form, an example of which can be found in Appendix 3. Data were extracted for all studies (n= 23) by one researcher and a subset (n = 11) was double extracted by a second researcher. All further data extraction forms were then checked for precision. Data extraction considered participant numbers, gender, age, language status, intervention types, use of a control or comparison group, baseline measures and the dependent variables. All disagreements following data extraction were resolved following discussion. A tabulation of the studies was produced post data extraction (see appendices 1 and 2).

2.4.2 **Assessment of bias and quality**

Following data extraction, a risk of bias was assessed for each of the 22 interventions (reported in 23 studies). The Cochrane risk of bias assessment tool for randomised trials (Higgins et al., 2011) was adapted to assess the quality of interventions. The risk of bias tool categorises risk with participant blinding to condition, attrition level and selective outcome reporting. An additional category was added for the purpose of this review; the potential for bias of the outcome assessment. For example, we assessed whether outcome measures were researcher developed, or standardised, normed assessments. The risk of bias assessment was carried out for each paper by experienced researchers in language education. Risk of bias assessments in medical interventions generally adhere to being ranked high or low, or in certain cases, interventions can be classed as having an ‘unclear’ risk of bias (Higgins et al., 2011). However, systematic reviews which evaluate education interventions tend to rank intervention quality as either high, low or medium (e.g. Murphy & Unthiah, 2015; Oxley & de Cat, 2019), thus giving a middle rank when independent evaluators are in disagreement. Consequently, it was decided to rank each paper as having either a low, medium or high potential for bias. For full definitions of the risk of bias classifications, see Appendix 1 (page 258). The results were then cross referenced and a final rating was given. We were conservative in our assessment, such that if researcher one ranked a study as 'high' and researcher two ranked a study as 'medium', we would give an overall classification of 'medium'. Likewise, if researcher one classified a study as 'low' and researcher two classified a study as 'high', a ranking of 'medium' would be given. Outcomes of the risk of bias measure can be found in Appendix 3 (page 267). Seven studies were found to have a high risk of bias, six studies had a medium risk of bias and ten studies had a low risk of bias. It was decided to include all studies in this review, despite the potential for bias in findings, due to a paucity of intervention literature with this population. Consequently, we advise caution to be taken when interpreting the results.

2.4.3 **Summary of results**

Twenty-three studies reporting 22 interventions conducted between 2000 and 2018 were eligible for inclusion in this review. Two studies reported the same intervention, with a longitudinal follow up (Nelson, Vadasy, & Sanders, 2011; Vadasy, Nelson, & Sanders, 2013).

2.5 Sampling

Twenty two of the 23 studies took place in the USA. The remaining study was conducted in the UK (Marshall & Hobsbaum, 2015). The studies took place between 2004 and 2018. No compatible interventions were found to have taken place between 2000 and 2004 according to our search terms. Four studies took place prior to 2010, (Carlo et al., 2004; Giambo & McKinney, 2004; Silverman & Hines, 2009; Uchikoshi, 2006), highlighting the emergent popularity of this research domain. The ages of children across the studies varied (range 4-12 years) and the majority of studies included children with Spanish as the home language (see appendix 1). All of the studies had a minimum of 50 participants. The range of participant numbers across studies was 69 (Vadasy & Sanders, 2015b) to 1490 (Cassady, Smith, & Thomas, 2018). Sixteen studies (reporting 15 interventions), reported a solely EAL population, whereas seven studies had a combination of monolingual and EAL participants. Where the samples were mixed, EAL intervention results were analysed separately to the ML participants.

Of the 22 interventions, the overarching themes were dialogic reading or explicit vocabulary instruction. In addition, four interventions used technology as a platform or an enhancement to an intervention (Cassady et al., 2018; Dalton, Proctor, Uccelli, Mo, & Snow, 2011; Silverman & Hines, 2009; Uchikoshi, 2006). One intervention used a family literacy programme to enhance oral language (O 'Brien et al., 2014) and one used continued professional development for teachers in addition to an oral language intervention (Castro et al., 2017). All studies had either a control group, who would take part in normal curriculum activities, or a comparator group taking part in a different intervention. Thirteen studies (reporting 12 interventions) reported two or more intervention groups, two of which (Collins, 2010; Uchikoshi, 2006) reported two interventions groups alongside a 'business as usual' (BAU) control. The remaining ten interventions used only a BAU comparator group acting as a control.

2.5.1 **Dialogic reading interventions**

Dialogic reading, first described in Whitehurst et al. (1988) involves practising language use, giving language related feedback and scaffolding adult-child interactions. Children generally will be encouraged to retell stories, or answer question prompts by adults. The adult may expand what the child has said and give definitions for vocabulary items as they occur within the story (Arnold & Whitehurst, 1994).

In this review, thirteen studies in total used dialogic reading as an intervention treatment. Five studies used a dialogic reading intervention as the main treatment (August, Artzi, & Barr, 2016; Collins, 2010; Crevecoeur, Coyne, & McCoach, 2014; Pollard-Durodola et al., 2016; Vadasy & Sanders, 2015a), with one study (Silverman & Hines, 2009), adding multimedia enhancement to one treatment group. Five studies used a dialogic reading condition as a direct comparison to an explicit vocabulary teaching condition (Goodrich, Lonigan, & Farver, 2013; Nelson et al., 2011; Pollard-Durodola, Gonzalez, & Zhu, 2018; Vadasy et al., 2013; Vadasy, Sanders, & Nelson, 2015). One study, (Giambo & McKinney, 2004) directly compared dialogic reading to a phonological awareness treatment. Studies which used dialogic reading as a comparator condition will be discussed in forthcoming sections.

Key features of the dialogic reading interventions included instruction of vocabulary items when encountered in the text (August et al., 2016; Collins, 2010; Crevecoeur et al., 2014; Pollard-Durodola et al., 2016; Vadasy & Sanders, 2015a), this occurred through embedding definitions (for example ‘magnets interact or *work with each other*’; August et al., 2016), through general discussions of words as they appeared in the text

(Collins et al., 2010; Crevecoeur et al., 2014; Pollard-Durodola et al., 2016; Vadasy & Sanders, 2015a), use of gestures and synonyms (Collins et al., 2010) and giving additional contexts for the words in addition to the story context (Collins et al., 2010; Crevecoeur et al., 2014).

Pre-teaching of vocabulary items also occurred. This was through teacher led discussions around topics (Pollard-Durodola et al, 2016), or through use of pictures and flashcards (August et al., 2016; Pollard-Durodola et al., 2016).
Additional intervention techniques included spelling practice and pronunciation when words occurred in the story (Vadasy & Sanders, 2015a) and multimedia video clips to enhance learning (Silverman & Hines, 2009).

Post-reading reinforcement was also carried out in studies (August et al., 2016; Crevecoeur et al., 2014; Crevecoeur et al., 2014; Pollard-Durodola et al., 2016). This was done through group work (August et al., 2016), class discussions (Crevecoeur et al., 2014; Pollard-Durodola et al., 2016) answering comprehension questions (August et al., 2016; Pollard-Durodola et al., 2016) describing pictures of target words (Crevecoeur et al., 2014) or drawing ‘concept maps’ (August et al., 2016) where children connected together different target words and concepts they had learned each week.
Two interventions (August et al., 2016; Pollard-Durodola et al., 2016) utilised the home language (Spanish) as part of the intervention. Both interventions used cognates to facilitate vocabulary acquisition.

Children ranged in age from four to ten years, highlighting dialogic reading as common intervention technique for younger children.

All interventions reported that dialogic reading led to vocabulary growth at post-test for some of the population. Studies with large effect sizes on outcome measures included August et al. (2016), Collins (2010), Crevecoeur et al. (2014), Pollard-Durodola et al.,(2016) and Silverman & Hines (2009). Results, however, should be interpreted with caution. Two of the dialogic reading interventions with large effect sizes were found to have a high risk of bias (August et al., 2016; Crevecoeur et al., 2014). The remaining interventions which reported a large effect size were found to have a medium risk of bias (Collins, 2010; Pollard-Durodola et al, 2016; Silverman & Hines, 2009). The interventions reporting small to medium effect sizes (Pollard-Durodola et al., 2018; Vadasy & Sanders, 2015a) were found to have a low risk of bias. Factors including baseline vocabulary and EAL status mediated the effect of the intervention in one study (Crevecoeur et al., 2014), whereby children with the largest baseline vocabularies made the greatest word learning gains. Dialogic reading proved to have greater effects when explanations and discussions with adults occurred, or explicit vocabulary definitions were given (August et al., 2016; Collins, 2010; Crevecoeur et al., 2014; Pollard-Durodola, 2016).

2.5.2 Explicit teacher-led instruction

Explicit instruction was used with a wider range of ages than dialogic reading. Four studies focused on children in the upper junior age range (ages 9-12) (Carlo et al., 2004; Dalton et al., 2011; Lesaux et al., 2010; Proctor et al., 2011). Four interventions with a focus on explicit, teacher led instruction, used a 'business as usual' (BAU) control group (Carlo et al., 2004; Goodrich et al., 2013; Lesaux et al., 2010; Baker et al., 2016) and one study (Vadasy & Sanders, 2015b) compared two explicit, instructional conditions. An additional five studies, reporting four interventions (Giambo &

McKinney, 2004; Nelson et al., 2011; Pollard-Durodola et al., 2018; Vadasy et al., 2013, 2015) compared explicit vocabulary teaching to dialogic reading.

Many studies showed that word learning growth occurred after explicit instruction. For example, Vadasy and Sanders (2015b) taught both explicit vocabulary and explicit vocabulary with spellings. In both conditions, children were given direct instruction in high frequency words including decoding, definitions and instruction of how to use the words in sentences. During the ‘explicit vocabulary spelling condition’ children additionally carried out target word writing, oral spelling and pronunciation.

Results showed that both conditions made significant gains in word reading, spelling and general vocabulary knowledge. However, greater gains were seen for the additional spelling condition on general vocabulary, word reading and taught-word spelling. Since this intervention took place with younger children (aged 4-8), it highlights that dialogic reading is not the only word learning technique which can be used for children at school onset.

Two studies (Baker et al., 2016; Carlo et al., 2004) used the EAL children’s first language (Spanish) to facilitate vocabulary learning during their interventions. While Baker et al. (2016) focused on supporting language transfer skills between Spanish and English during an academic language and phonological awareness intervention, Carlo et al. (2004) implemented Spanish translations, English definitions and Spanish-English cognates for support during an explicit intervention of word meanings. Instruction also focused on pronunciation, polysemy and morphology. Although using Spanish throughout their intervention, Carlo et al. (2004), found monolingual children also made vocabulary gains while undertaking the intervention. Lesaux et al. (2010) similarly found that monolingual children were able to benefit from an intervention that was specifically tailored to EAL children. Repetitions of academic vocabulary across multiple contexts resulted in both monolingual and EAL children enhancing their knowledge of targeted items.

Six studies carried out explicit instruction, compared to interactive book reading. These were Giambo and McKinney (2004); Goodrich et al. (2013); Nelson et al.,(2011) Pollard-Durodola et al. 2018; and Vadasy et al. (2011; 2013). Interventions by Nelson et al. (2011) and Vadasy et al. (2013, 2015a) treated children (5-6 years) explicit instruction of high frequency decodable root words, compared to an 'interactive book reading' group as control. Nelson et al. (2011) additionally implemented decoding instruction. The controls were taught the same words but in a storybook context. Results showed that the group undertaking explicit instruction made significantly greater gains in vocabulary and reading compared to the storybook reading group. At a follow up one year later, (Vadasy et al., 2013) the gains remained greater for the explicit instruction group, although with smaller effect sizes than previously.

Similarly to Nelson et al. (2011), Giambo and McKinney taught phonological awareness skills including blending and segmenting activities, with storybook reading comparator group. Although both groups significantly improved their vocabularies, the phonological awareness group had a greater pre to post-test effect size, suggesting their vocabulary growth was greater. However, since significant results were found for both groups, interactive book reading was also highlighted as a successful intervention method. This was similar to the conclusion drawn by Pollard-Durodola et al., (2018). Their intervention compared an interactive reading condition with additional daily lessons and visual supports, to an explicit vocabulary condition. There was no significant difference between the two conditions, with both making gains from pre to post-test on taught words. The authors conclude that explicit instruction interventions are expensive to implement, whereas interactive book reading is a much more time and cost effective resource to use in schools. Since growth occurred in both conditions, the authors suggest interactive book reading might be a more practical intervention for schools to carry out.

In contrast, interventions with less explicit features within this age group led to no intervention effects. Marshall and Hobsbaum (2015), the only study conducted in the UK, explicitly taught ‘Sign Supported English’ (SSE) to 4-5 year old children with English as an additional language. Children from another school which did not implement SSE were used as a control. Post-test results found that the only effect on vocabulary growth was time, suggesting there were no differences between the intervention group, using SSE, and the comparison school which used a business as usual approach.

Summary: Explicit Instruction

Explicit instruction interventions led to vocabulary gains across all studies, except for Mashall and Hobsbaum (2015), which may have been because teachers instinctively use gestures when teaching young children, leading to confounds between the intervention and treatment group.

When storybook reading was used as a comparator to an explicit instruction intervention, there was a tendency for the effect sizes to be higher for the explicit condition (Nelson et al., 2011; Vadasy et al., 2013, 2015). This held true when the explicit instruction was for features of phonological awareness, such as phoneme deletion and segmentation (Giambo & McKinney, 2004). Pollard-Durodola et al. (2018), however, reported gains for both their explicit instruction and storybook reading conditions, with negligible difference in gains between groups.

Interventions that were found to have a high risk of bias were Carlo et al. (2004); Giambo and McKinney (2004) and Marshall and Hobsbaum (2015), these results should therefore be interpreted with caution. The remaining interventions with a primary focus of explicit teacher-led instruction were found to have a low risk of bias.

2.5.3 Explicit computer assisted interventions

Proctor et al. (2011) and Dalton et al. (2011) both report on a computer assisted intervention called 'Improving Comprehension Online' (ICON). ICON is a computer-based, 'scaffolded text environment' aimed at improving the reading ability of both monolingual and EAL learners aged 11-12.

Proctor et al. (2011) used ICON to present eight multimedia texts with embedded instruction of 40 words with reading strategy support. Five words were taught per text, of which approximately 60% were Spanish/English cognates. Students were given each word's definition, a Spanish translation, an example sentence and then a relevant image. Students listened to the recorded word and then wrote or audio-recorded a personal connection to the word. Results showed significant intervention effects compared to the control group on standardised measures of vocabulary. There were also significant effects on researcher developed measures of vocabulary depth but not breadth. The ICON intervention did not benefit the Spanish-English group at a differential rate to English group on standardised measures. The differences were parallel, suggesting the intervention was as effective for monolinguals as EAL pupils. Dalton et al. (2011)

found that teaching comprehension strategies was less effective in terms of vocabulary development for EAL children compared to explicit vocabulary teaching or a combination of both approaches. However, the vocabulary gap between monolingual and EAL pupils disappeared for those using explicit vocabulary or combination intervention techniques, suggesting they were effective strategies for EAL children's vocabulary growth.

Cassady et al. (2018) also used technology enhanced vocabulary instruction with computer-assisted instruction. The instruction used the 'Imagine Learning' (IL) literacy package in which pupils received direct instruction in five areas: phonological awareness; phonics; fluency; vocabulary and comprehension. Teachers were additionally given support in differentiation strategies. The results found greater gains for the treatment group over the controls in terms of vocabulary, phonics, phonological awareness and text comprehension. Results also showed that those with the lowest initial language proficiency made the greatest gains in vocabulary in comparison to the control group, suggesting this intervention was particularly effective for children with the smallest vocabularies at pre-test.

Two interventions using explicit computer-assisted instruction were found to have a high risk of bias (Dalton et al., 2011; Proctor et al., 2011), therefore we recommend results being interpreted with caution.

2.5.4 **Implicit word learning intervention**

Uchikoshi (2006) implemented an implicit vocabulary intervention as the sole intervention technique, using two television shows, watched repeatedly in school time.

Group one watched ‘Arthur’ repeatedly in class, while group two watched ‘Between the Lions’ and group three watched nothing at all. These educational television shows were chosen as they are both 30-minutes long, target vocabulary learning and are targeted at preschool and kindergarten children. Whereas ‘Arthur’ embeds new vocabulary into the narrative of the show, ‘Between the Lions’ highlights new vocabulary on screen. Growth modelling analysis revealed no effects of classroom viewing but those who watched shows at home had steeper growth trajectories than those who did not. Overall, all three groups increased their vocabulary knowledge at about the same pace. The authors suggest the lack of intervention effects could be due to no reinforcement after viewing. This intervention was found to have a medium risk of bias, with a lack of effect size, we advise results be interpreted with caution.

2.5.5 **Professional development intervention**

Interventions with professional development are underrepresented in this sample, with only one study having an element of pedagogic support for teachers.

Castro et al. (2017) studied the efficacy of a programme of continued professional development for teachers (Neustros Niños School Readiness Professional Development Program) alongside a language, literacy and social-emotional development programme and mathematics learning. The Neustros Niños School Readiness (NNSR) programme is founded upon five instructional strategies: Ongoing and frequent assessments, focused small group activities, explicit vocabulary instruction, development of academic English and a focus on social-emotional development. Alongside the intervention, teachers were given professional development of the implementation of the instructional strategies.

Language results showed that greater gains in expressive vocabulary were demonstrated by the EAL children in the treatment condition. Furthermore, when assessed in Spanish, there were higher gains in receptive vocabulary.

2.5.6 Family literacy programmes

O'Brien et al. (2014) used a parental based intervention, in which adult literacy classes were given in addition to encouraging home reading practices with dialogic reading methods. The family literacy programme was delivered to 158 EAL children aged between four and nine years from low income families. Parents were taught reading strategies for at home use with their children in addition to English language classes focusing on literacy. Parents were taught the importance of reading with children in terms of the child's development and learning. The authors reported that children with the lowest vocabulary at pretest made significant growth, however those with a medium to high baseline vocabulary did not differ to controls. This intervention was found to have a medium risk of bias.

2.6 Discussion

A systematic review of word learning interventions in primary school children with EAL was carried out. Twenty three studies, reporting twenty two intervention studies published between 2000 and 2018 were included in the current review.

2.6.1 Summary of evidence

Twenty three studies reporting 22 interventions were eligible for inclusion in the current review. The interventions provide collective evidence that explicit vocabulary training in context can produce word learning gains for both children with EAL and monolingual children. When new words are explicitly taught, children with EAL can learn at the same rate as their monolingual peers, or, in some cases, at a faster rate (Carlo et al., 2004; Dalton et al., 2011; Leasaux et al., 2010; Proctor et al., 2011). Dialogic reading can also lead to vocabulary growth and these interventions were more typically carried out with younger children. A recent meta-analysis of the effects of adult-led book reading in families found that 4% of the variance could be attributed to effects of Whitehurst and colleagues' (1988) dialogic reading technique (Mol, Bus, de Jong, & Smeets, 2008). This could be because dialogic reading introduces children to contextually relevant, formal language (Raikes et al., 2006).

Dialogic reading interventions with a direct comparison to an explicit teaching condition in this review, showed a tendency towards smaller comparative vocabulary gains in comparison to directly taught vocabulary. Dialogic reading interventions in which definitions of target vocabulary items and contextual information were given provided greater gains than conditions where either no definitions or in-text only definitions were provided.

Two studies showed no intervention effects across measures; implicit acquisition through television viewing and sign supported English instruction. The implicit intervention supports growing evidence that children with the smallest vocabularies find it more difficult to acquire vocabulary from context without additional support (Stanovich, 1986). There are also promising results from interventions that are assisted with technology. Such interventions would be able to be implemented without additional staff, however there might be a complication in terms of cost or whether the school has adequate technology provisions to support the programmes, as well as the cost of licenses for the technology.

2.6.2 Future Research Suggestions

This review provides evidence that explicit word learning interventions can lead to word learning gains for both EAL and monolingual children. Further research should be carried out within the context of the UK looking at whole class interventions, where the sample is heterogeneous. This could lead to vocabulary growth for both monolingual children and those with EAL. Furthermore, this review has provided evidence that dialogic book reading can led to vocabulary growth for younger children. This could be an engaging intervention to carry out in nursery school and reception classrooms, in order to close the vocabulary gap between EAL children and monolinguals upon starting schooling. Furthermore, this resource would be fairly easy to implement in schools and would also be relatively cost effective.

Explicit vocabulary interventions have consistently produced larger gains, however such interventions could be more time consuming and difficult to carry out in addition to curriculum demands and without additional staffing. Although technology enhanced interventions could overcome the need for additional staff, the additional cost this may lead to in terms of licencing fees are unknown, and schools may not have adequate ICT resources to implement such interventions repeatedly. Furthermore, since there was only one intervention which focused on developing a family literacy programme, it would be beneficial to see more of such studies available in the future. Family literacy programmes may be beneficial to EAL children as the home language environment is important for children’s vocabulary growth, both for monolinguals and bilinguals

(Burgess, Hecht, & Lonigan, 2002; Van Steensel, 2006; Wood, 2002) and teachers in England and Scotland have identified a paucity of knowledge around EAL pedagogy (Pye et al., 2016). It is also recommended that future studies are true randomised control trials, in order to reduce the risk of bias.

2.6.3 Limitations

Weaknesses of the current study include a high risk of bias within the synthesised studies. Seven of the 23 interventions were judged as having a high risk of bias, which may limit the strength of evidence to our conclusions. Interventions in educational settings often randomise at either district, school or class level rather than at pupil level, which may have led to selection bias. Furthermore, high attrition rates were reported due to the migratory nature of the population. Many studies in the present review relied on researcher based measures to test for pre- and post- intervention vocabulary knowledge. Where standardised measures were used, results were often compared to standardised scores which were conducted on monolinguals, therefore overall reliability of the interventions is questionable. We did not eliminate studies based on having a high risk of bias due to the small number of interventions being carried out with EAL children, however future systematic reviews could eliminate studies with a high risk of bias once more has been published in this area. We recommend future intervention studies to carefully consider bias risk both during the design and implementation phase. Publication bias may also be a confounding factor to this systematic review. The term publication bias refers to the trend of studies being published only when they have statistically significant findings. Conversely, negative or null results may not be accepted for publication in leading journals. This can threaten the validity of systematic review findings (Torgerson, 2006). In the current review, searches were conducted only of peer-reviewed journal articles. Peer review was sought as an appropriate measure of intervention quality. However, this could have led to a bias towards interventions with significant outcomes and could skew the current findings. We suggest that future reviews should consider publication bias when assessing inclusion criteria, and look to evidence from grey literature (such as unpublished doctoral theses, conference abstracts and pre-prints) to gain a true picture of the evidence.

Furthermore, this review sought to analyse effective word learning interventions that could be used in the UK. Twenty two of the 23 studies were conducted in the USA, with populations not representative of UK classrooms. Classrooms in the USA are often homogenous, and the interventions can be written with translations and cognates to facilitate word learning. As we saw in this review, the majority of studies included speakers of Spanish as the largest learner group. Furthermore, baseline tests could be carried out to ascertain baseline home language skills. Caution must be taken when reviewing the compatibility of such interventions within the UK.

It is also worth noting that many of the studies in this review were aimed at children classified as ‘lower infant’ (ages 4-5 years). We classified children into this age group as it corresponds with the Early Years Foundation Stage of primary school in the UK. However, only one study (Marshall & Hobsbaum, 2015) took place in school. As the remaining nine studies with lower infant participants took place in the USA, where the onset of compulsory schooling is aged five, the interventions took place in a pre-school environment. It is difficult to assess whether the same provisions would be available to children who had already started compulsory schooling and whether the same effects would therefore occur.

This review highlights the possible gains of word learning interventions for EAL populations which could be implemented within the context of the UK.

2.7 Conclusions

Children with EAL start school with a lower vocabulary than their monolingual peers. Early interventions are recommended in the first years of schooling so that children will not fall further behind.

This review found that interventions with explicit features such as decoding, phonological awareness, spelling and print awareness as well as meaningful definitions in context led to vocabulary growth for both monolingual and EAL pupils. Such interventions would be beneficial to implement for the whole classroom. Growing evidence suggests that monolingual pupils from a lower SES area may be a risk factor to an impoverished vocabulary (Foster, Lambert, Abbott-Shim, McCarthy, & Franze, 2005; Hoff, 2013; Raviv, Kessenich, & Morrison, 2004) so such interventions would be a beneficial, holistic approach to improve the vocabularies of both EAL and ML children.

There is a lack of interventions focusing on the whole family. One intervention in this review used a family literacy programme (O'Brien et al., 2014). Such interventions which both support the parents' development of English and engages children in home-based literacy events and practices, may be beneficial to enhance children's vocabulary even before the onset of schooling. Research suggests that the home literacy environment is important when considering the language development of children (e.g. Burgess et al., 2002; Van Steensel, 2006; Wood, 2002). Although these may be difficult to implement in the UK with the heterogeneous language sample, in schools in which the majority of pupils speak the same L1 it could be possible to implement a family literacy programme such as O'Brien et al. (2014). Limitations would be timescale and cost. Dialogic reading interventions may be a low cost and time efficient way to teach vocabulary to EAL. It is common in schools for Teaching Assistants or volunteers to take out small groups for intensive reading practice, so this type of intervention may be easy and cost effective to implement.

This review has provided evidence that interventions can reduce the vocabulary deficit for both older children and younger children with English as an additional language. However, limitations to this review show how we must interpret these results with caution due to risk of bias. Further research is needed in order to verify the conclusions drawn.

Chapter 3: Methodology of Empirical Studies

3.1 Introduction

This chapter provides details of the methodology, recruitment and data collection procedure for three experimental studies with differing aims. All three studies critically examine novel word learning abilities of children with EAL and their monolingual peers. This chapter includes information regarding the research aims; design of experimental materials; recruitment of participants; data collection and analysis.

3.2 Aim of the studies

The overall aims of the studies were to address the research questions regarding whether language status (EAL or ML) would impact language learning ability. As previously identified (see introduction), children with EAL consistently demonstrate a vocabulary deficit in comparison to their monolingual peers. With regards to the Matthew Effect (see Chapter 1), we would expect that those with a smaller vocabulary would have greater difficulty acquiring new words. However, the systematic review (see Chapter 2), has identified that with the correct support, EAL children are able to learn at the same rate as their monolingual peers. Consequently, we sought to explore novel word learning across two conditions, explicit and implicit instruction.

Study 1 reports an explicit word learning experiment which replicated the experimental design of Gellert and Elbro (2013) (for more details, see Chapter 4). The objective was to determine whether EAL children would benefit from explicit vocabulary instruction of six novel words over and above their ML peers. A secondary objective was to see whether there was a relationship between existing vocabulary size and novel word learning ability. Study 2 (see Chapter 5) used the same experimental stimuli as study 1, however, children were introduced to the novel items implicitly, whilst listening to a story over headphones. The objective was to fully explore whether a lack of direct instruction would create similar results to study 1. Study 3 (see Chapter 6) sought to explore the relationship between novel word learning ability, and vocabulary growth over one year. Children who took part in study 1 were visited the following academic school year to undergo an additional measure of English vocabulary knowledge.

3.3 Recruitment

Recruitment for studies one and three began in the winter term of 2016 and recruitment for study two took place twelve months later. Four schools were recruited to take part in study one and two schools took part in study two. Recruitment took place via email and telephone communication with head teachers. Where head teachers were interested in taking part in the study, formal meetings were arranged in schools to give more information about the project and to obtain written consent.

3.4 Confounding variables

Socio-economic status has been shown to impact vocabulary size in children (see Hart & Risley, 1995). Therefore, where possible, we sought to recruit children from schools from similar areas of social deprivation. To account for this, we used the postcode of the school to determine the school postcode's indices of multiple deprivation (IMD) ranking, These rankings are from 1-10 whereby 1 represents postcodes that are in the most deprived 10% of postcodes nationally (see Table 2).

We recruited schools based upon a sample of convenience. Fifty schools were contacted via email. Six schools in total were interested in taking part in the research, four of which were ranked as IMD 1. We did not collect personal postcode information from pupils, therefore it is possible that not all children were from households within the same IMD ranking as the school. One school (school F) was ranked as IMD 5, however the postcodes of bordering areas ranged from 1-3, which may have included some of the intake pupils.

The criteria for participation in all of the empirical studies in this thesis were that the children with EAL had been in mainstream education in an English speaking country for a minimum of one year. This enabled the research team to fully communicate with all participants and ensure their understanding of the tasks. Children (both ML/EAL) with special educational needs relating to speech and language, did not take part in the task as their inclusion could confound results. These included children with specific phonological processing difficulties (as the task was delivered via audio), such as dyslexia, developmental language disorder, or children with hearing impairments. Children with special educational needs which did not relate to speech and language could participate, but it was at the discretion of the researcher to stop if the task appeared too challenging.

Limitations to this method of selection may have led to a sample of children not wholly representative of mainstream classrooms in the UK. For example, diagnosis of speech and language impairments is difficult in children with EAL. Children can be over-diagnosed with a speech and language impairment when in actuality their language deficit is caused by a lack of exposure and not a disorder (Adler, 1990; Ball &

Bernhardt, 2008; Kritikos, 2003; Pray, 2003; Terrell & Terrell, 1983). Alternatively, children with an underlying speech and language impairment may not have been referred to a speech and language therapist (Flipsen, 1992; Holland, 1983; Tonkovich, 2002) due to poor language proficiency being misunderstood as a lack of language exposure. Consequently, children may have been excluded from our sample who were wrongly diagnosed as having a speech and language disorder. Conversely, children may have been included in the sample who had an underlying impairment which has not yet been diagnosed.

A further confounding variable would be the quality of teaching the children have been exposed to. As a general measure of school *quality*, we matched schools on their most recent Ofsted inspection result. At the time of data collection, all schools were classed as 'good' by Ofsted.

Table 2 *Demographic information about recruited schools*

School	Classes per year group	Indices of Multiple Deprivation (IMD)
A	Three	1
B	One	1
C	Two	1
D	Three	3
E	Three	1
F	Two	5

3.5 Consent

Ethical approval was granted from the University of Leeds Ethics committee for all experiments (see Chapters 4, 5 and 6). All experiments sought written consent from school head teachers. Opt-out consent was sought from parents. Opt-out was chosen over opt-in consent at the request of the head teacher from school A (Head teacher A).

Due to the nature of the populations we recruited (those with EAL and from a lower socio-economic status), it was decided that using opt-in consent would result in a population unrepresentative of UK classrooms. Upon discussion with Head teacher A, it was decided that written translated letters home to parents would be difficult, due to the many languages spoken in school. As all school information was sent home to parents in simplified English, our consent forms were written in short, simple sentences with commonly occurring vocabulary. A second information sheet was also provided with more extensive detail about the experiments for parents, should they require it. Parental information evenings were additionally offered to parents, however no schools decided to implement these.

All remaining schools were happy for opt-out consent to be used with parents. At the time of testing, children were given a fact sheet about the experiment in accessible language and gave verbal assent. Six parents in total opted out of the study.
From the remaining children, class teachers then selected children to take part, eliminating children who were very new to English (less than one year of input) and those that were categorised by the school as having a special educational need that would hinder language learning. Children were classified as having EAL by school, based on parental responses when enrolling children in the UK school system for the first time. Information about pupil SEND and EAL status was stored on private in-school databases, which the research team did not have access to. It was therefore necessary for teachers to select pupils (both ML and EAL) to take part in the studies. Teachers were asked to include children from a range of abilities, with a balance of children with high, medium and low attainment abilities for both EAL and ML groups. This was based on teachers’ perceptions of children’s abilities and not based on any

standardised tests. This could have introduced an element of selection bias, by which teachers may have selected only highly achieving children or those without behavioural difficulties. If children were high performing this may have affected the overall effect size of the group difference. However, if children had behavioural difficulties this may have led to limitations in their attention during the tasks. All of the children had been to an English speaking school and therefore exposed to immersive English for at least one year prior to the study. All children had normal or corrected to normal vision and hearing.

3.6 Data collection

3.6.1 Research assistants

One second year Psychology Undergraduate research assistant was recruited to aid data collection for experiment one, and five final year Undergraduate research assistants aided data collection for experiment two. No additional assistants were required for experiment three. All research assistants were required to undertake an enhanced Disclosure and Barring Service (DBS) check. Prior to data collection, research assistants were fully trained by the principal investigator and were supervised when working with the children. Research assistants conducted both experimental measures and standardised, baseline assessments.

3.7 Baseline measures

Measures of both receptive and expressive vocabulary were used to measure vocabulary depth and breadth. Measures of phonological memory have consistently demonstrated a relationship to vocabulary knowledge (e.g. Gathercole, Willis, Baddeley & Emslie, 1994; Gathercole, 2006), therefore, we decided it would be important to measure the children's baseline phonological skills. In addition, we took a measure of non-verbal reasoning as a control for non-verbal IQ. This enabled us to make sure that both EAL and ML pupils were from a similar range of academic abilities, when oral language was not taken into account.

3.7.1 **Receptive vocabulary**

A baseline test of English receptive vocabulary was carried out through administering the British Picture Vocabulary Scale III (Dunn et al., 2009). The BPVS is the British equivalent to the American Peabody Picture Vocabulary scale (Dunn & Dunn, 1981), which is one of the most commonly used tools to assess bilingual children in the USA (Caesar & Kohler, 2007). The BPVS III is a standardised, normed test for children between the ages of 3:00 and 16:11. The BPVS III was chosen for use in this thesis as it is a highly utilised tool across both language research and language diagnostics. For example, the BPVS is recommended for use by the Royal College of Speech and Language Therapists (RCSLT, 2003). Furthermore, since it is a tool suitable for a wide variety of age groups, it was deemed appropriate to accurately capture the vocabulary size of children with varying degrees of English exposure.

BPVS norms are based on a sample of 3278 students from 147 schools. For the age group of the current study, the standardisation was based upon 188 pupils from 14 schools. Schools for which the standardisation was based upon were asked to give details of any children with EAL. Of 161 schools taking part in the whole sample, only 116 provided data. As a result, only 45 children across the entire sample were identified as having English as an additional language. Since the majority of the sample were monolingual, it was decided not to use normed scores for this study and therefore avoid a bias towards monolingual pupils. Raw scores only were used in the analysis for EAL children but standardised scores were calculated for monolingual children. When comparisons between EAL and ML children took place, raw scores were used for both groups.

The test was administered in a quiet space in the school approximately seven days after the initial experiment. The experimenter orally presented a given word and the child was asked to point to the appropriate picture from a choice of four. The administration method described in the manual was followed.

3.7.2 **Expressive vocabulary**

Expressive vocabulary in English was tested using the expressive vocabulary subtest of the Clinical Evaluation of Language Fundamentals-IV (CELF-IV) (Semel, Wiig & Secord, 2003). Expressive vocabulary tasks are important to use in addition to receptive tasks to capture the vocabulary of children. Whereas receptive tasks give a general picture of a child’s vocabulary, they tend to be based on sparser representations and expressive tasks rely on deeper word knowledge with more concrete representations. Furthermore, the CELF is a short measure, taking approximately five minutes to administer, therefore it was deemed more appropriate than other expressive vocabulary measures for practicality purposes.

In this test, the child looked at a series of pictures, one picture per panel. The children were asked to name either the entire picture, or an element of the picture, for example, children were presented with a group of cows, and the experimenter asked ‘what is the name of these animals together?’ Two points were awarded for a complete correct response and one point was awarded for an appropriate response, as deemed acceptable by the manual.

3.7.3 Phonological memory

A measure of short term phonological memory was administered using the Children's Test of Nonword Repetition (Gathercole & Baddeley, 1996). Phonological memory was chosen to be assessed as it has significant, positive correlations with vocabulary knowledge (Gathercole, Willis, Baddeley & Emslie, 1994). In particular, the CNRep has correlations between language measures including vocabulary and comprehension. Such correlations are consistently higher than other tests of verbal language with incorporates memory tasks, such as auditory digit span (Gathercole et al., 1994).

The nonword stimuli conformed to both the stress pattern regulations and the phonotactic rules of English. The children heard 40 nonwords in total, varying between two, three, four and five syllables. Children were presented with the aural stimulus recorded by a female native speaker through Sennheiser HD 580 precision headphones in a quiet space in the school. The children were told that they were to hear a 'funny made up word' and that they were to repeat the word as accurately as possible. Repetition accuracy was recorded online by the experimenter. One point was awarded for a correct response and no points were awarded when one or more phonemes diverged from the target. Zero points were awarded if no attempt was made, but in these circumstances the recording track was stopped to allow additional thinking time for the child over the three second spacing between novel words.

3.7.4 Non-verbal reasoning

A measure of non-verbal reasoning was included in the test battery to determine a general measure of intelligence of the children without taking language into account. The matrix reasoning subtest of the Wechsler Abbreviated Scale of Intelligence-II (Wechsler, 2011) was administered to measure the children's fluid and visual intelligence, spatial ability, and perceptual organization. The WASI-II was chosen over other common matrices for children (such as the Continued Progressive Matrices, CPM; Raven, 2008) due to the quick administration procedure. The test consisted of 28 matrices, with a discontinuation criteria of three sequential incorrect answers. The CPM (Ravens, 2008), in comparison, consists of 36 matrices with no discontinuation criteria, and is consequently a more length administration process.

During administration of the WASI-II, children were presented with a sequence of four to five white panels with a coloured picture inside each, presented in the middle of a page. One of the panels in the sequence contained only a question mark. Directly underneath the sequence, there were a selection of coloured pictures numbered one to five. The children were asked which appropriate picture from a selection of five would fit to complete the pattern. The sequences increased in difficulty and the test was stopped once three incorrect answers were given consecutively. Children were given no verbal feedback at the time of testing.

Assessments were delivered at the time of treatment for studies one and two (see Chapters 4 and 5) and then the measures of vocabulary were repeated at a post-test delay of twelve months (Chapter 6).

Table 3 *Assessment tools used to establish baseline scores*

Measure	Reliability	Age Range (years)	Approximate time	Administration
British Picture Vocabulary Scale (BPVS-III)	0.91 (Cronbach's Alpha)	3-15	10 minutes	One-to-one
Children's Test of Non-word Repetition (CNRep)	0.8 (correlation coefficient) for 7 year olds	4-8	15 minutes	One-to-one with audio recording and headphones
Clinical Evaluation of Language Fundamentals (CELF-IV) Expressive Vocabulary Subtest	Across ages and subtests, test-retest reliability coefficients ranged from .71 to .86	5-9	5 minutes	One-to-one
Wechsler Abbreviated Scale of Intelligence (WASI-II) Matrix Reasoning Subtest	Reliability coefficients across subtests for children ranged from good (.87) to excellent (.91)	6-90	5 minutes	One-to-one

3.8 Language background analysis and EAL demographics

English proficiency of children with EAL strongly influences a child's academic success (see Chapter 1). Since 2018, schools are no longer required to record the proficiency of children in their classes with EAL, therefore there were limited opportunities whilst collecting data to control for children's English language knowledge. It was therefore decided to create an oral questionnaire to deliver to children with EAL to gain more information about their language ability and dominance. Attempts were made to collect language background data from parents, however responses were low.

3.8.1 Designing a language background questionnaire for EAL children

There is a dearth of methodological knowledge of how children should be surveyed (e.g Borgers, de Leeuw, & Hox, 2000). Depending on the age of a child, difficulties may be encountered whilst cognitive, communicative and social skills are yet to be fully developed (Borgers et al., 2000). It is generally recognised that the question answer process requires a number of cognitive processes. Firstly, the respondent needs to be able to understand the question, then retrieve information from memory in order to devise an answer. Next, the answer requires formatting and editing depending on the audience. Finally, the newly formed answer requires communicating (Schwarz & Sudman, 1996; Tourangeau & Rasinski, 1988). The complex cognitive processes involved in the question and answer paradigm may have limitations for children, whose capabilities with cognitive tasks are age dependent (Scott, 1997). For bilingual children, considerations more than age alone need to be taken into account.

Proficiency scores on their own may not be enough to identify bilingual children's language dominance (Marian, Blumenfeld, & Kaushanskaya, 2007). A child with more than one language may have several factors which influence their language knowledge and usage, such as the age at which they learned their second language, and their language experiences (Grosjean, 2006; Kenneth Hyltenstam & Abrahamsson, 2003). Research suggests that second language competence can be sub-categorised into three domains, the age at which second language learning commenced, the length of time the subject has been exposed to the additional language and language proficiency (determined by self-reporting) (Marian et al., 2007). Self-reported language proficiency scores tend to be problematic in linguistic studies and can lead to inflation or deflation of skills based on participant's confidence or anxiety around speaking the additional language (MacIntyre, Noels, & Clément, 1997). Due to the potential inaccuracies of self-reported competence measures, paired with the cognitive demands of self-rating, this questionnaire opted not to use self-reported language proficiency. Instead, we opted to ask the children about their language preference in terms of speaking, reading and writing. Standardised measures of receptive and expressive vocabulary were collected as a means of calculating (English) language proficiency and were analysed separately during experimental studies (see Chapters 4, 5 and 6).

Immersion duration was measured through questions relating to at what age the child started school in an English-speaking country, if the child has ever lived in a different country and whether they attended school in that country. Finally, the extent of the child's language exposure was measured through the children's own report of the languages they spoke to, and heard from, various family members including parents and siblings.

We attempted to collect language questionnaire data with all children classified as EAL. Data from six children could not be collected, resulting in a final sample of 111 children. The questionnaire was administered at the time of experimental data collection (see appendix 5).

3.8.2 EAL sample characteristics

Twenty seven different languages were spoken by 111 children with EAL. Of those languages, the most commonly spoken were Bengali (n=24), Urdu (n= 23), Arabic (n=10) and Punjabi (n=10).

Less than half of EAL children (n=47), had lived in another country before living in the UK. Of those children, 22 had attended nursery or school in that country. All children had attended school in the UK for at least one year prior to data collection and all were considered orally competent in English by their teachers.

3.8.3 Spoken language preference

Children were asked whether they found it easier to speak in English, in their first language (L1), or if they found both the same. More than half of children (n=63), found it easier to speak English than their L1, compared with 15 children who found it easier to speak in their L1. The remaining children (n= 33) found it equally as easy to speak in English and the L1. This verified our assumption that children taking part in the studies would be orally competent in English.

3.8.4 Reading preference

Of all the children who were questioned (n=111), 44 children declared they could read, at least to some extent, in their first language. However, of the 44 children, 32 found it easier to read in English, seven found it equally as easy to read in English and the L1 and just five found it easier to read in the L1.

3.8.5 Writing preference

All children were asked if they could write in their first language. For the purpose of this questionnaire, when children declared they could write a few words, such as their name, they were considered unable to write in the L1. A small subset of children was able to write in their L1 (n=15). Of those, 14 found it easier to write in English and one child found it equally as easy to write in English and the L1.

3.8.6 Spoken language usage

Children were asked about the frequency of which they spoke English in the home. They chose from four options; all of the time, most of the time, sometimes and never. Eleven children spoken English all of the time at home, never speaking the L1 in the home. Thirty three children spoke English most of the time, but would sometimes speak in the L1. Fifty five children spoke English sometimes and the L1 sometimes. Twelve children never spoke in English at home, exclusively speaking in the L1.

3.8.7 Communication with family

Children were asked about the languages that they spoke with certain members of their families. Children chose from five options: only English; mostly English, but sometimes [L1]; both English and [L1] equally; mostly [L1], but sometimes another language; only [L1].

Thirty children only spoke the L1 with parents, 17 children mostly spoke the L1 with parents but sometimes spoke English. Twenty three children spoke both English and the L1 equally with parents. Fourteen children mostly spoke English with parents but sometimes spoke the L1 and 27 children only spoke to their parents in English.

3.8.8 Communication with siblings

Of the 111 children, 99 reported having siblings. Of the 99, 65 children only spoke English to their siblings. Twelve children spoke mostly English but sometimes the L1. Ten children spoke both English and the L1 equally to their siblings. Three mostly spoken in the L1 but sometimes spoke English and nine children only spoke the L1 to their siblings.

3.8.9 Communication with extended family

Fifty four children only spoke the L1 to extended family members, such as grandparents, aunts and uncles. Ten children spoke mostly the L1 but sometimes English. Twenty six children spoke both English and the L1 equally to extended family, 5 children spoke mostly English but sometimes the L1 to extended family and 16 children only spoke English to extended family.

3.8.10 Summary: EAL sample characteristics

One hundred and eleven children were administered an oral questionnaire to gather information about their language preference and usage. More than half of the EAL children in this sample had only ever lived in the UK and over 80% had only attended nursery or school in the UK. Of those who had attended school in another country, all had been in the UK education system for at least a year prior to data collection and were considered competent at speaking English by their teachers.

More than half of children found it easier to speak English than their L1, and only a very small subset reported finding it easier to speak the L1 than English (n=15). Less than half of children could read in their L1 (n=44) and very few were able to write in the L1 (n=15). The majority of children who were able to read and write in the L1 found it easier to do so in English.

Most children spoke a mixture of English and the L1 in the home, with a small subset speaking only English (n=11) or only the L1 (n=12).

English was the most popular language spoken to siblings, whereas the L1 was the most common language used with wider family members.

Language usage with parents was variable, with 27 children only communicating in English, and 30 communicating solely in the L1. The remaining children spoke a mixture of the L1 and English with parents. This confirms research that the category of EAL is heterogeneous and encompasses a wide range of children with different exposures to English and the L1 and different usage (e.g. Strand et al., 2015; Demie, 2018; Hutchinson, 2018). We therefore consider this sample of children representative of EAL children across the UK.

3.9 Experimental design

Studies one and two used a within-subjects, repeated measures design with two groups of participants (Monolingual and EAL children). Studies one and two used different samples of children from different schools. One hundred and ten children in study 1 took part in all experimental procedures across two time points, and 80 children took part in all experimental procedures in study 2. Time one was immediately after training and time two was after a delay of one week. Study 3 was a longitudinal follow up to study 1. No experimental design was implemented here, all children repeated the baseline measures of expressive and receptive vocabulary that they had undertaken in the first study.

3.9.1 Experimental measures

Experimental measures of word learning were used for studies one and two (see Chapters 4 and 5). In study 1 (see Chapter 4), we replicated the methods of Gellert & Elbro (2013), who investigated novel word learning and vocabulary growth in 79 monolingual, Danish speaking children and 11 bilingual children (9-10 years). Children were taught six novel words (see Chapter 4) and were tested on their static knowledge of Danish vocabulary. Approximately eight months later, children were re-tested on their receptive and expressive vocabulary knowledge of Danish.

Gellert and Elbro's methods were replicated in study 1 (Chapter 4), however, we carried out certain adaptations to provide a more rigorous methodology. Firstly, whereas the original study used flashcards controlled by the researcher, we opted to use experimental generator software. Due to the nature of the learning task in experiment one, DMDX (Forster & Forster, 2003) was deemed the most appropriate software to use. This is because the training task required an aspect of learning to criteria which can be accommodated in DMDX.

Learning to criteria means that participants continue the training aspect of an experiment until they have met a certain requirement, or they reach the end of the trials, whichever happens first. DMDX software enables users to create loops of script which can then count appropriate responses and subsequently move to the next task once the criterion has been met.

3.9.2 Data analysis

During experiments one and two, post-test measures of recall and recognition were collected over two time points, one week apart. This enabled us to investigate immediate word learning through post-tests carried out directly after training, and also after a delay of one week. Data was analysed using a two way repeated measures analysis of variance, whereby group and time, and their interaction, were analysed. This enabled us to study group differences across two time points.

Further t-tests were carried out to investigate group differences on baseline measures for all studies and vocabulary training for studies 1 and 2.

Study 3 followed a longitudinal design. Where possible, all children from study 1 were re-administered baseline measures of receptive and expressive vocabulary 12 months after initial testing. These data were then entered into a hierarchical linear regression analysis. A hierarchical linear regression analysis was chosen as it was necessary to enter initial vocabulary scores at time one as the first step, to act as an auto-regressor. Experimental measures were then entered to see if they could predict vocabulary growth over one year.

3.10 Summary of methods

This thesis presents empirical research examining the novel word learning abilities of children with EAL and their monolinguals peers. The overall aims of the studies were to address whether language status (EAL or ML) would impact language learning ability. We sought to explore novel word learning across two conditions, explicit and implicit instruction. In addition, a longitudinal follow up study was carried out to determine if experimental measures of word learning could predict English vocabulary growth over one year.

In addition to experimental measures, children carried out standardised measures of receptive and expressive vocabulary (studies 1, 2 & 3), phonological memory and non-verbal intelligence (studies 1 & 2). Children were also administered a researcher-designed oral language questionnaire to establish their exposure to English and their first language.

Chapter 4: Does knowledge of more than one language enhance the ability to learn novel words encountered in an explicit task?

4.1 Introduction

Experimental literature on language development and acquisition generally focuses on monolingual children (Gathercole, Hitch, Service, & Martin, 1997; Henderson & James, 2018; Henderson, Weighall, Brown, & Gaskell, 2013). Yet, as many as 1 in 5 children in English schools speak EAL (DfE, 2018).

Reading comprehension skill is dependent upon on the quality of lexical representations of words (Perfetti, 2007). A complete representation of a word is multi-faceted and must include not only knowledge of its phonology and orthography but also many aspects of semantic meaning (Gupta & Tisdale, 2009). For successful reading comprehension, mental representations of words should derive from accurate lexical representations which can be quickly retrieved. The semantic representation, both in terms of the word's literal meaning and more extensive background knowledge (such as synonyms or antonyms) must be acquired, in addition to the syntactic structures into which the word can fit, and how it can alter morphologically (Nagy & Scott, 2000).

High quality lexical representations (orthographic, phonological and semantic) are bound together so when one branch is retrieved (such as the word's pronunciation), other types of information are also accessed (e.g. its spelling and meaning).

The exposure to two or more language structures in childhood presents additional challenges to lexical development, as children must learn multiple phonological and orthographical entries per semantic representation. When learning to read, monolingual children build upon their existing vocabulary, learning orthographic forms of familiar spoken words. Children with EAL must often learn the orthographic, semantic and phonological representation of a new word simultaneously.

Between the ages of one and eight, monolingual children typically learn around 2.2 new words per day, with a vocabulary at the end of primary school reflecting around 9000 root words (Biemiller & Slonim, 2001). Many children with EAL, however, enter school with a limited English vocabulary which persists throughout schooling (e.g. Cameron, 2002; Mahon & Crutchley, 2006). Consequently, research concerning how children with EAL acquire vocabulary is necessary.

4.2 Bilingual word learning in an explicit context

Explicit training of the phonological and semantic aspects of new vocabulary items has proven to be successful in teaching vocabulary to monolingual children (Beck, Perfetti, & McKeown, 1982; Becker, 1977; McKeown, Beck, & Omanson, 1985; White, Graves, & Slater, 1990).

Furthermore, word learning experiments have demonstrated that the ability to learn the phonological aspects of novel words can predict first language vocabulary growth over time. For example, Gellert & Elbro (2013) investigated the link between novel word learning and first language vocabulary growth in 79 monolingual, Danish speaking children and 11 bilingual children aged 9-10 years. Children were seen at two time points, eight months apart. At T1, children were tested on their baseline receptive and expressive vocabulary knowledge of Danish, as well as being taught six novel words for animal referents. Words were taught over two blocks. Block A contained the words *goni*, *salu* and *fybe*. According to the authors, Block B words were more phonologically complex. These words were *targelli*, *pimut* and *mafyk*.

Children were initially exposed to the novel words and definitions which were read aloud to them by a researcher, alongside a picture referent presented on a flashcard. They were asked to repeat both the novel word and description. They then had up to 14 attempts to learn each novel word in the training phase, in which a researcher showed the child a cardboard flashcard with the visual stimulus of the novel word. The child was then asked to name the novel item and was given corrective feedback.

At post-test, children were tested on their ability to define, freely recall and recognise the novel words, both immediately after training, and after a delay of one week.

Approximately eight months later, children were re-tested on their receptive and expressive vocabulary knowledge of Danish and these results were entered into a hierarchical multiple regression with six predictor variables from the original post-tests. Findings suggested that the phonological aspects of novel word leaning (measured through a composite score of the children's vocabulary training score and their novel word recall immediately after training), predicted their overall vocabulary growth in Danish. The phonological aspects of word learning were a stronger predictor of true vocabulary growth than the children's ability to define the novel words. The authors therefore considered the semantic aspects of word learning less predictive of true vocabulary growth than the phonological aspects. However, some key questions arise from Gellert and Elbro's study.

Firstly, Gellert and Elbro used researcher developed tests of baseline expressive vocabulary and a translated version of the PPVT-II (Dunn & Dunn, 1981) as a receptive measure. Their researcher developed expressive measure was a picture naming task with words selected from school books about history, science and social studies. This is similar to expressive tasks in English, such as the subtest of the CELF-IV (Semel et al., 2003). However since this measure was not standardised with age appropriate norms, it is difficult to interpret the baseline vocabulary knowledge of children in the study compared to national averages and may lead to biases within samples. Similarly, it causes difficulties when comparing outcomes to other such studies of novel word learning in children. It is useful to replicate this task using age normed, standardised language measures.

In addition, few studies investigating the predictors of vocabulary growth have considered children who grow up exposed to more than one language (e.g. Farnia & Geva, 2011; Sénéchal & LeFevre, 2014). Since evidence suggests that EAL children start school with a smaller English language vocabulary than their monolingual peers, and the vocabulary gap persists throughout school (e.g. Mahon & Crutchley, 2006; Cameron, 2002), it is important to understand the vocabulary trajectories of EAL children and the skills which may predict vocabulary growth. As a consequence, it may be easier to identify children who will benefit from targeted vocabulary interventions.

4.3 Explicit word learning in bilingual adults and children

Bilinguals can experience a word learning advantage for novel items in comparison to monolinguals, and this has been shown extensively for adults (Bartolotti & Marian, 2012; Bartolotti, Marian, Schroeder, & Shook, 2011; Kaushanskaya & Marian, 2009a, 2009b; Kaushanskaya & Rechtzigel, 2012; Van Hell & Mahn, 1997; Wang & Saffran, 2014). Bilingual children, dominant in English but acquiring a second language (L2) through language immersion classrooms have shown an advantage in novel word learning compared to monolingual children, when the labels map onto already known objects (Kaushanskaya et al., 2014). In contrast, when novel concepts were mapped on to novel items (aliens), the monolinguals and bilinguals performed equally and no advantage was shown. Such bilingual advantages with novel word learning may be due to the bilingual’s better ability to map novel labels to known concepts (e.g. Kaushanskaya & Marian, 2009a; Kaushanskaya et al., 2014; Papagno & Vallar, 1995; Van Hell & Mahn, 1997). One possible explanation for this advantage is that bilingualism may change mutual exclusivity constraints meaning that bilinguals are able to cope with two or more labels for one object. This has been found in studies of early-bilinguals (e.g. Byers-Heinlein & Werker, 2009; Davidson et al., 1997) (see Chapter 1), however the findings from Kaushanskaya et al. (2014) may suggest that even late onset bilingualism can alter mutual exclusivity constraints.

Direct instruction through explicit tasks can result in a higher rate of vocabulary acquisition compared to incidental learning, if engagement is high (Schmitt, 2010). It has been estimated that the successful implementation of direct instruction in word learning can improve a child’s vocabulary by approximately 300 words per year (Stahl & Fairbanks, 1986).

The main purpose of the present study is to investigate whether measures of experimental word learning with direct instruction can predict vocabulary growth over time in monolingual children who speak EAL. This is explored fully in Chapter 6. The study replicated the methods of Gellert and Elbro (2013) but with a population of monolingual English speakers and children who spoke English as an additional language.

We investigated whether having knowledge of two languages gave pupils an advantage of novel word learning or whether they were disadvantaged due to a smaller English vocabulary. It is important to understand how children with EAL learn new vocabulary in order to help them close the gap between them and their monolingual peers, which evidence suggests persists throughout school (e.g. Mahon & Crutchley, 2006; Cameron, 2002). With more knowledge about how EAL children learn vocabulary, more information can be gleaned about how best to support them in the classroom and which interventions may best foster their English vocabulary growth.

Traditionally, children's language knowledge has been measured through static, norm referenced assessments of oral language and reading (e.g. Bishop, 1997; Howlin & Cross, 1994). When static assessments are administered to children, items are presented by the researcher successively to the child, without feedback or intervention (Sternberg & Grigorenko, 2002). Whereas static assessments measure child's language knowledge at one particular time point, a dynamic assessment measures learning potential. Dynamic assessments include feedback, and children gain a training score, and sometimes also a post-test score (Sternberg & Grigerenko, 2002). As the children are given training with feedback, dynamic assessments measure a children's learning ability, rather than their pre-existing knowledge which may be unfairly biased towards children with more English language exposure. Consequently, dynamic assessments could be more sensitive in identifying children with EAL who have an underlying language need.

However, there are drawbacks to such tests. Jitendra and Kameenui (1993) identified several limitations to dynamic assessments. Firstly, dynamic models may vary in definition and theoretical framework, thus comparisons across different assessments are difficult. Perhaps the biggest drawback to dynamic assessment is the time taken to carry out the procedure. Since they are carried out one-to-one with a child, dynamic assessments can be labour intensive for both the administrator and the child, and may take up to sixty minutes to administer per child (e.g. Hasson, Camilleri, Jones, Smith, & Dodd, 2013). However, dynamic assessments can be advantageous. They have been found to distinguish between EAL children with and without language impairments (Hasson et al., 2013; Peña, Quinn, & Iglesias, 1992) and to predict future educational achievement (Byrne, Fielding-Barnsley, & Ashley, 2000; Samuels, Killip, MacKenzie, & Fagan, 1992). While most speech and language therapists use standardised tests which are normed on monolingual children to assess a child’s language needs (De Lamo White & Jin, 2011), dynamic assessments, using a test-teach-test approach, may be a better alternative to assess language deficits.

This study sought to determine the factors necessary for successful novel word learning, including baseline English vocabulary knowledge and phonological awareness. Based upon previous findings, we predicted that more than one language would enhance novel word learning (e.g. Bartolotti & Marian, 2012; Bartolotti, Marian, Schroeder, & Shook, 2011; Kaushanskaya, 2012; Kaushanskaya & Marian, 2009a, 2009b; Van Hell & Mahn, 1997; Wang & Saffran, 2014). However, since the literature suggests that EAL children do have a smaller English vocabulary than their ML peers (e.g. Cameron, 2002; Mahon & Crutchley, 2006) and underlying vocabulary knowledge relates to word learning ability in children (Penno, Wilkinson, & Moore, 2002), it could be that MLs are advantaged.

Our research questions were thus:

1. What is the effect of language status (EAL vs. ML) on novel word learning ability?
2. Do baseline vocabulary scores in English contribute to novel word learning ability?

4.4 Methods

To test the robustness of Gellert and Elbro's results, we conducted a power analysis using the software GPower (Faul and Erdfelder, 1992) to determine an adequate sample size for analyses in which six predictor variables were used in a multiple regression analysis. The effect sizes used for this calculation were small (f 2 = .02), medium (f 2 = .15), and large (f 2 = .35) (see Cohen, 1977) with a p <.05 alpha level. For a medium effect, a sample size of 98 would be necessary. The original study had a sample of 90 children at T1, however, due to attrition the longitudinal follow up consisted of only 67 children, which may mean that the study was underpowered. The current study reported in this thesis over recruited from the original sample size to allow for attrition (n=110). The results of the regression can be found in chapter 6. This chapter reports only T1 results.

4.4.1 Participants

The participants were 43 ML children (22 male and 21 female) aged seven to nine years (mean age 8;1 years; SD 3.4 months; range 7:6-8:7) and 67 EAL children (31 male and 36 female) aged seven to nine years (mean age 8;1 months; SD 3.8 months; range 7;6-8;6). Participants were recruited from four mainstream primary schools in Yorkshire. Schools were recruited via email. Information packs with details of the study were sent to head teachers once ethical approval for the study was gained and four schools were interested in taking part. All of the schools were classified as "good" by Ofsted. All schools were situated within a six mile radius of each other. Testing began in April 2017 immediately after Easter half term and continued until July 2017. Every effort was made to ensure that schools were matched to areas of similar socio-economic status (see Chapter 3).

4.4.2 Consent and participant selection procedures

Opt-out parental consent was sought (see chapter 3). Four parents returned the forms to opt out of the study prior to data collection. Two further parents wished to exclude their child post data collection. Ten children were eliminated due to incomplete data sets, and one child was eliminated as they were diagnosed with a Speech and Language Impairment as data collection was being carried out.

Baseline measures were standardised for monolingual participants and pupils were eliminated from the study if their age standardised score was 85 or below on two out of three language measures. Such criteria have been used in previous studies to identify children with potential language impairment (e.g. Gooch, Hulme, Nash, & Snowling, 2014; Nash, Hulme, Gooch, & Snowling, 2013; Thompson et al., 2015).
It was felt appropriate by the research team to eliminate such pupils as their underperformance relative to their peer group may be indicative of a language impairment. This resulted in nine monolingual pupils being eliminated from the original sample, leaving a final monolingual sample of 43. It was felt unnecessary to eliminate EAL children using the same criterion, as atypical performance on standardised English language assessments may have been indicative of lack of exposure, rather than an underlying language impairment.

Sixty seven of the children were classified by school as having ‘English as an additional language’. Prior to testing, all children were orally asked if they could speak any languages other than English. This information was then cross-referenced with the data from school. A breakdown of language backgrounds of EAL children can be seen in Table 4.

Table 4 *Languages spoken by EAL pupils (n=67)*

Language Spoken	**N**
Bengali	23
Urdu	15
Punjabi	7
Polish	6
Romanian	3
Kurdish	2
Somali	2
Arabic	1
Farsi	1
Shona	1
Lithuanian	1
Malay	1
Pashto	1
Slovak	1
Swahili	1
Spanish	1

The final sample included one set of twins and one set of triplets (all of whom had English as an additional language).

An independent-samples t-test identified that there was no significant difference between groups (EAL and ML) in terms of age in months (t (108) =.12; p = .909)

4.4.3 **Baseline measures**

Baseline measures of vocabulary (both receptive and expressive), phonological memory and non-verbal intelligence were administered during the experimental phase using standardised measures (see Chapter 3).

4.4.4 **Design**

Training and testing took place over two sessions. In session one, children completed the vocabulary training of six novel words and their definitions, and a standardised measure of non-verbal reasoning. As this was a direct replication, novel words, definitions and distractor items were taken directly from the original study (Gellert & Elbro, 2013). At the end of training, the children were tested on measures of definition knowledge, immediate recall and immediate recognition. Participants returned approximately one week later (7-8 days). In the second session, participants carried out measures of delayed recall and delayed recognition of the novel words, as well as standardised measures of vocabulary, and phonological memory.

4.4.5 **Materials**

This study presented stimuli via DMDX software (Forster & Forster, 2003). This enabled a learning task under uniform experimental conditions. Stimuli have been uploaded to the Open Science Framework and can be found online at https://osf.io/jc3xr/.

Children were presented with cartoon images of six animals on the screen on an HP ProBook Laptop. The recordings were carried out by a female, monolingual English speaker and were then cut and normalised using Audacity (Audacity Team, 2012). This ensured all sound files were at the same volume and that extraneous sounds were removed from the recordings. The images were presented alongside the recordings via Sennheiser HD 580 precision headphones. Visual stimuli from the original task were of poor quality when transferred into DMDX, therefore suitable similar stimuli of a higher pixel count were used. These stimuli were found via an online search of images that were freely available. For the final post-test of recognition (immediate and delayed), the visual stimuli for the six novel words were accompanied by three distractor animals, a sheep, a horse and a monkey (see appendix 7), which were the same distractor items used in the original study (Gellert & Elbro, 2013).

Table 5 *Novel words and their corresponding definition*

Novel word	Definition	Visual Stimuli
Block A (phonologically simple CVCV)		
Goni	A sad, blue, red-haired fish	
Fybe	An orange, striped, sleeping cat	
Salu	A big, brown, dangerous dog	
Block B (phonologically more complex)		
Targeli	A fat, white, spotted cow	
Mafyk	A green, dotted, poisonous snake	
Pimut	An old, grey, singing bird	

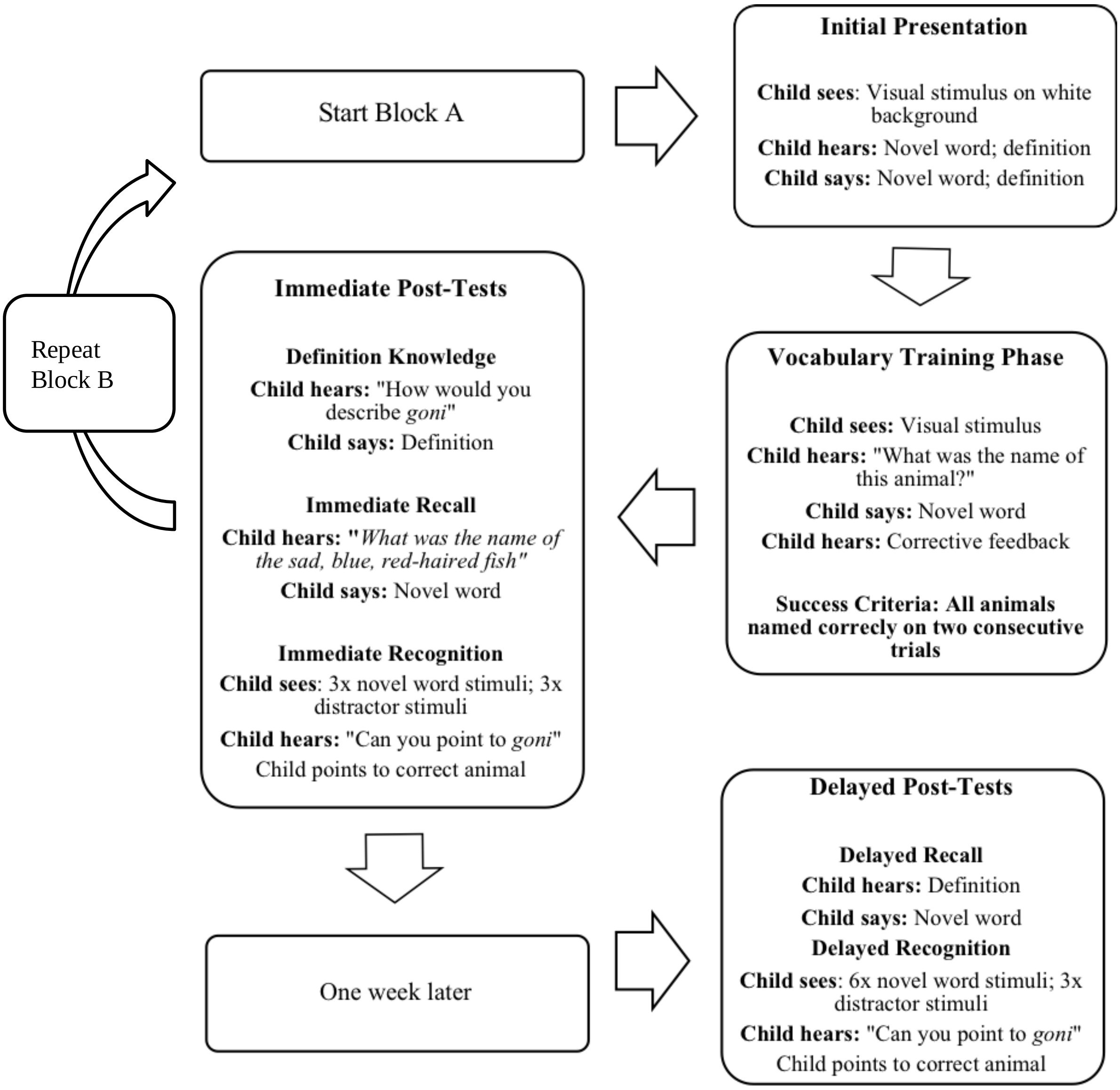

Figure 4 *Experimental protocol for explicit novel word learning*

4.5 Procedure

The word learning procedure took place in four stages, as detailed in Figure 4. All measures were administered by a researcher in a quiet space in school. Individual testing took place in two sessions. In session 1, children carried out two blocks of word learning measures (block A/block B), separated by the measure of non-verbal intelligence. In session 2, seven days later, children carried out delayed post-tests and standardised measures of vocabulary and phonological memory.

4.5.1 Word learning measures

Initial Presentation. During initial presentation, children saw a picture referent for the novel word, and heard the novel item and its definition. Each picture was presented in the centre of the screen with a white background (Figure 5). The children were asked to repeat the novel name and the accompanying definition of the animal. Only one exposure of the item and definition was presented at this stage.

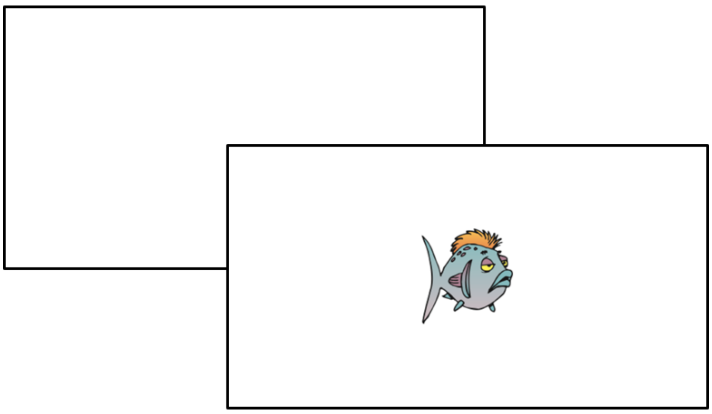

Figure 5 *Example of initial presentation*

4.5.2 Novel word learning phase

Vocabulary training. Immediately after initial presentation, the children were shown the visual stimuli in a randomised order and asked to provide the corresponding novel word by the phrase ‘what was the name of this animal’. If the child gave the correct response they then heard ‘that’s right, it’s *goni’.* If an incorrect response was given, the child would hear ‘that’s not quite right, it’s ‘*goni’.* For the words in block B, which were more phonologically challenging, the child could hear the first syllable of the word as a prompt ‘it’s a *pim*_’, replicating the original study (Gellert & Elbro, 2013).

However, if a prompt was needed, the subsequent answer given by the child scored zero, whether correct or otherwise. This was directly replicating the methods of the original study. The success criteria for the vocabulary training task was to name all three animals in one block correctly on two consecutive occasions without a prompt, or to reach 14 trials, whichever happened first. One point was awarded for each item named correctly, with a maximum of 42 points per block.

The learning to criterion procedure was adopted in order to replicate the methods of the original study as closely as possible. This meant that once criteria had been met (all animals names correctly on two consecutive trials), the computer program automatically skipped to the post-tests and participants were awarded full marks for all remaining trials, as correct responses were assumed. Participants were counterbalanced across the blocks, resulting in half of the sample hearing the more phonologically challenging block A words first, and the other half hearing block B first.

4.5.3 **Immediate post-tests**

Definition knowledge. Following the vocabulary training, the children were assessed on their knowledge of the novel word definitions. The children heard the phrase 'what do you remember about *goni*' as a prompt to see how much related semantic information they remembered. The child was additionally prompted to include as many details as possible from the noun and three adjectives they were previously taught with the phrase 'yes, and can you tell me more about *goni*'. A maximum score of four points per item was given for each of the correct attributes. Following definition knowledge, the participants carried out immediate recall.

Immediate recall. During the immediate recall task, the child heard the definition of the novel words and was asked to name the animal referent (e.g. 'what was the name of the sad, blue, red-haired fish'). The score was one point per correct response and the maximum score was therefore six.

Immediate recognition. The child was presented with pictures of the three target animals and three distracters. The child was then asked via the headphones to point to a particular target with the phrase 'can you point to *goni'*. The pictures were then randomly shuffled via the computer and the procedure was repeated for the remaining novel words. No feedback was provided and the score was the number of tokens correctly chosen. Approximately one week later, the delayed measures were administered.

4.5.4 Delayed post-tests

Delayed recall. The children heard each of the definitions of the six words aloud and were asked to provide the name for each one. The score was the number of items identified correctly chosen and the maximum score was six.

Delayed recognition. In the final of the experimental measures, the child was presented with a combination of the six pictorial stimuli and three distracters. The child then heard the phrase 'can you point to_' through the headphones and was asked to point to the corresponding picture. No corrective feedback was given. The pictures were randomly shuffled and the task was repeated until all of the novel words had been tested. The score was the number of correct responses, with a maximum score of six.

4.6 Results

4.6.1 Baseline measures

For all standardised tests, raw scores were used for statistical analysis of the whole sample (see table 6). Since standardised scores are normalised with a mainly monolingual population, it was deemed biased to use such scores to assess children with EAL.

Independent samples t-tests were conducted to compare the raw score means of EAL and monolingual pupils for the standardised measures of expressive and receptive vocabulary. Receptive vocabulary for monolingual pupils was significantly higher than EAL pupils with a large effect size. Expressive vocabulary for monolingual pupils was also significantly higher than EAL pupils with a large effect size. There was no significant difference in means on two further baseline measures of phonological short-term memory (nonword repetition) and non-verbal reasoning.

Table 6 *Descriptive statistics for baseline measures*

Measure	Maximum Score	Mean		Range		*p*	Cohen's d
		EAL	ML	EAL	ML		
Receptive Vocabulary	168	92.00 (13.75)	108.23 (14.01)	69-133	82-140	<.01	1.17
Expressive Vocabulary	54	29.01 (7.76)	37.00 (5.72)	11-47	27-47	<.01	1.17
Phonological Memory	40	28.52 (4.23)	30.00 (4.38)	17-36	19-36	.838	.34
Non-verbal Reasoning	24	10.54 (4.63)	10.72 (4.34)	2-20	3-21	.836	.04

4.6.2 Experimental measures

As expected, all children were quicker to learn the more phonologically simple block A words than the more challenging block B words. The average number of trials needed for monolingual children in the vocabulary training for the more phonologically simple (CVCV) words in block A was 8.14 (SD = 3.7) and 7.97 for the EAL children (SD = 3.57). The average number of trials needed for monolingual children for the more phonologically complex words in block B was 10.93 (SD =3.64) and 10.67 for EALs (SD = 3.60). Descriptive statistics for all measures can be seen in Table 7.

Table 7 *Descriptive statistics for experimental measures*

Measure	Maximum Score	Mean		Range	
		EAL	ML	EAL	ML
Vocabulary Training	84	54.04 (15.87)	50.70 (18.05)	16-82	9-77
Definition Knowledge	24	15.16 (4.02)	16.35 (4.74)	6-22	7-31
Immediate Recall	6	4.87 (1.48)	4.16 (1.56)	0-6	0-6
Delayed Recall	6	2.42 (1.72)	2.40 (1.85)	0-6	0-6
Immediate Recognition	6	5.82 (0.58)	5.63 (0.98)	3-6	1-6
Delayed Recognition	6	5.52 (0.89)	5.19 (1.05)	2-6	2-6

Results close to ceiling were found for both measures of recognition across groups, suggesting both groups were able to recognise the novel words easily, even after a delay of one week. In contrast children's ability to recall the novel words after a delay of one week was much lower (approximately half) than at immediate recall.

4.6.3 **Training**

Independent samples t-tests confirmed there were no significant differences between groups on measures of vocabulary training (p=3.09) or definition knowledge (p=.163).

4.6.4 **Recall**

A two-way ANOVA was carried out to assess the impact of delay across the two groups with Session (Recall1/ Recall2) as a within-subjects factor and group (ML/EAL) as a between-subject factor (see Figure 6).

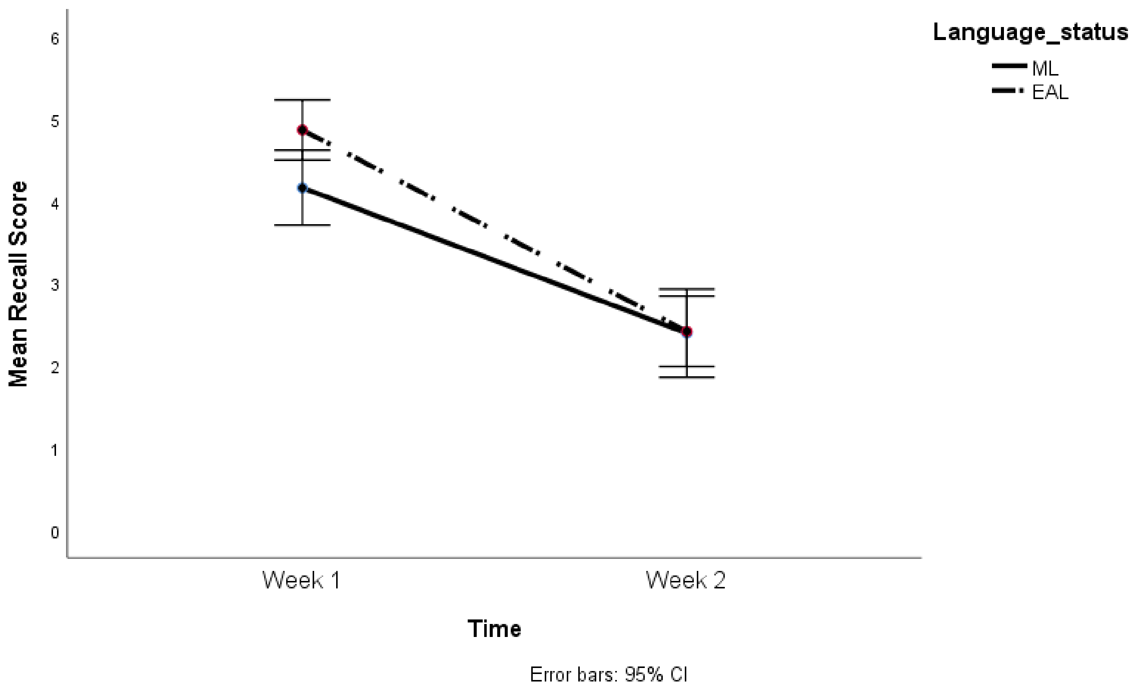

Figure 6 *Recall of novel items immediately (T1) after explicit instruction and after a one week delay (T2)*

A significant main effect of time was found (F (1, 108) = 156.94; p <0.01, η^2 =.59) as both MLs and EALs recalled significantly fewer novel items after a delay of seven days. No significant main effect of group was found (F(1, 108) = 1.76, p= 0.188, η^2 = 0.16). The interaction between group and time was significant (F(1, 108) = 4.09, p = .046, η^2= .04) so two post-hoc independent samples t-tests were carried out, (EAL/ML at T1; EAL/ML at T2) with a Bonferroni adjustment for multiple comparisons (α=.025), revealing that EAL children showed a significant advantage over ML children at immediate recall (t(108)= 2.39, p =.019).

After a delay of one week, there was no significant differences between groups (t(108)= .07, p = .95), suggesting a short term advantage of novel word learning that was not sustained long term..

4.6.5 **Recognition**

As with recall, a mixed design 2x2 analysis of variance was conducted to assess the impact of delay on ability to recognise novel words across groups. Session (Recognition1, Recognition2) was entered as a within-subjects factor and group (ML, EAL) as a between-subject factor (see figure 7).

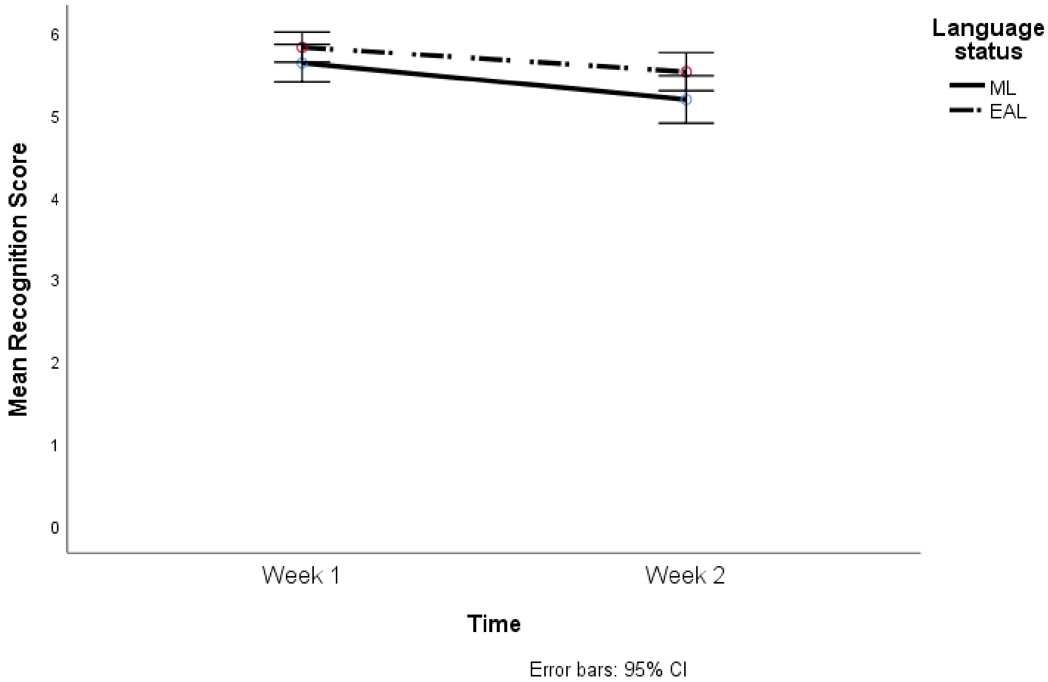

Figure 7 *Reognition of novel items immediately (T1) after explicit instruction and after a one week delay (T2)*

A significant main effect main effect of time (F(1, 108) = 19.72, p <0.01, η^2=.15) revealed that both group recognised fewer words after a delay. The main effect of group was not significant (F(1, 108) = 3.25, p = .074, η^2 =.03) and neither was the interaction between group and time (F(1, 108) = .74, p = 0.39, η^2=.01). Results immediately after training were at ceiling for both groups, and, although a decline was seen over a week, results were still approaching ceiling at the second test point, demonstrating that recognition was an easy task for participants in both groups. This may have been due to the nature of the distractor items chosen. The distractors were three concrete and imageable animals, a sheep, horse and monkey (Gellert & Elbro, 2013). However, animals as a word class are acquired in early childhood (Gleason, 2014), and therefore the task of differentiating between two distinct animal images would have been easy for children by age 7, leading to ceiling effects. Despite this, there was a small but statistically reliable decrement in recognition over time.

In order to establish whether vocabulary measures at baseline were associated with novel word learning performance, data from each group (ML/EAL) were subjected to two separate Pearson's r correlations (See Tables 8, 9 & 10). The intercorrelations within both groups ranged from non-significant to high.

Table 8 *Pearson's r correlations for monolingual children*

	1	2	3	4	5	6	7	8	9
1. Vocabulary Training	-								
2. Definition Knowledge	0.56**	-							
3. Immediate Recall	0.81**	0.55**	-						
4. Delayed Recall	0.54**	0.17	0.44**	-					
5. Immediate Recognition	0.35*	0.37*	0.46**	0.36*	-				
6. Delayed Recognition	0.44**	0.34**	0.52**	0.50**	0.53**	-			
7. BPVS-III	0.26	0.22	0.16	0.10	0.04	0.11	-		
8. CELF-IV	0.29	0.29	0.16	0.24	0.10	0.06	0.58**	-	
9. WASI-II	0.26	0.10	0.32*	0.22	0.46**	0.35*	0.21	0.28	-
10. CNRep	0.29	0.01	0.19	0.20	0.00	0.36*	0.09	-0.07	-0.10

*$p < .05$;***$p < .01$

Table 9 *Pearson's r correlations for EAL children*

	1	2	3	4	5	6	7	8	9
1. Vocabulary Training	-								
2. Definition Knowledge	0.45**	-							
3. Immediate Recall	0.74**	0.48**	-						
4. Delayed Recall	0.47**	0.31*	0.41**	-					
5. Immediate Recognition	0.30*	0.33**	0.38**	0.22	-				
6. Delayed Recognition	0.36**	0.40**	0.39**	0.41**	0.54**	-			
7. BPVS-III	0.35**	0.30*	0.26*	0.31*	0.12	0.30*	-		
8. CELF-IV	0.30*	0.35**	0.24	0.38**	0.24	0.29*	0.69**	-	
9. WASI-II	0.27*	0.21	0.18	0.23	0.22	0.31*	0.41**	0.41**	-
10. CNRep	0.29*	0.30*	0.30**	0.34**	0.03	0.20	0.28*	0.40**	0.20

*$p < .05$;***$p < .01$

Table 10 *Pearson's r correlations for the whole sample*

	1	2	3	4	5	6	7	8	9
1. Vocabulary Training	-								
2. Definition Knowledge	0.48**	-							
3. Immediate Recall	0.77**	0.46**	-						
4. Delayed Recall	0.50**	0.24**	0.45**	-					
5. Immediate Recognition	0.32**	0.33**	0.43**	0.28**	-				
6. Delayed Recognition	0.41**	0.34**	0.47**	0.44**	0.55**	-			
7. BPVS-III	0.22*	0.29**	0.07	0.19*	0.00	0.10	-		
8. CELF-IV	0.20*	0.34**	0.07	0.28**	0.08	0.10	0.73**	-	
9. WASI-II	0.26**	0.16	0.22*	0.23*	0.32**	0.32**	0.31**	0.33**	-
10. CNRep	0.27**	0.19*	0.27**	0.28**	-0.01	0.19*	0.25**	0.29**	0.09

*$p < .05$;**$p < .01$

4.7 Novel word training

Overall receptive and expressive vocabulary correlated positively with vocabulary training scores for ML pupils (receptive r = .26, p = .099; expressive r= .20, p =.064) but not significantly so. For EAL pupils, vocabulary training again correlated moderately with receptive vocabulary (r = .35, p <.01) and expressive vocabulary (r =.30, p= .014), which were both significant. Whole group correlations between vocabulary training and receptive and expressive vocabulary were positive and significant (receptive r =.22, p = .022, expressive r=.20, p = .034). There was also a positive correlation between phonological memory and ability to learn novel vocabulary for both groups (ML r =0.29, p =.058; EAL r =0.29; p=.016). Although this was not significant for the ML children, both correlations were of the same size for EAL and ML groups. The insignificant finding for ML children may be as a result of a smaller sample size.

Whole group correlations between vocabulary training and phonological memory were significant (r =.27, p<.01).

4.7.1 Immediate post-tests

Definition knowledge. Receptive and expressive English vocabulary scores correlated positively with the experimental measure of definition knowledge for ML children, but not significantly so, (receptive r =.22, p =.150; expressive r= .29; p =.056). For the EAL group, receptive and expressive English vocabulary scores did correlate significantly with definitions knowledge (receptive r=.30, p =.015; expressive r=.35, p <.01). Whole groups correlations between receptive and expressive vocabulary and definition knowledge were positive and significant (receptive r =.29, p <.01; expressive r = .34, p <.01). This positive correlation was expected, as the larger the child’s vocabulary, the more able they were to describe the semantic characteristics of the novel items. EAL children's phonological memory additionally correlated with definition knowledge (r= .30, p =.013), but this was not the case for ML children (r =.01, p =967). As a whole group, phonological memory did correlate significantly with definition knowledge (r=.19, p = .046).

Immediate recall There was only a small, positive correlation for both groups between expressive or receptive vocabulary and immediate recall, which was significant for the EAL group (ML receptive r=.16 p=.299; expressive r=0.16, p=.312; EAL receptive r=.26; p =.037; expressive r=.24 p =.047). For the whole group, the correlations were non-significant (receptive r=.07, p = .454; expressive r =.07, p = .459). These correlations were small, suggesting both EAL and ML children's ability to recall the novel items was not directly related to their current English vocabulary.

EAL children's phonological memory did correlate moderately and positively with immediate recall (r=.30, p<.01), suggesting the better the EAL children were able to repeat nonwords, the better their ability to successfully recall novel items in the task. Correlations between ML children's phonological memory and immediate recall were small and non-significant (r=.19, p=.215). As a whole group, phonological memory correlated positively and significantly with immediate recall (r = .27, p <.01. There was a moderate correlation between general cognitive ability and immediate recall for monolingual children (ML r = .32, p = .036), which remained significant across the whole sample (r=.22, p = .019).

Immediate recognition. Immediate recognition scores were approaching ceiling and did not correlate significantly with baseline vocabulary scores for either group, suggesting all found the task straightforward regardless of language knowledge. The correlations between general cognitive ability immediate recognition (ML *r* =.46, *p* <.01; EAL *r* =.22, *p* =.076) were significant for the ML group and considered moderate, whereas they was only a small, non-significant correlation found for the EAL group. For the whole group, immediate recognition scores and general cognitive ability correlated positively and significantly (*r* =.32, *p* <.01).

4.7.2 Delayed post-tests

Delayed recall Correlations between receptive and expressive vocabulary scores and experimental measure of delayed recall were positive and significant for the EAL group only, with a moderate degree of correlation (receptive *r*=.31, *p*=.010; expressive *r*=.38, *p*<.01), whereas for the ML group the correlations were small and non-significant (receptive *r* =.10, *p* =.538; expressive *r* = .24, *p* =.121). For the whole group, correlations were positive and significant (receptive *r* = .19, *p* =.047; expressive *r* -.28, *p* <.01).

Delayed recognition Correlations between receptive and expressive vocabulary scores for the experimental measure of delayed recognition were positive and significant for the EAL group only, with a moderate degree of correlation (receptive *r*=.30, *p* =.014; expressive, *r*=.29, *p*=.017). Non-significant correlations were found for the ML group (receptive *r*=.11 *p* =.505; expressive *r* =.06, *p* =.687). For the whole group, correlations between receptive and expressive vocabulary scores and delayed recognition were not significant (receptive *r* =,10 *p* =.310; expressive *r* =.09, *p* =.338). Further correlations between general cognitive ability and delayed recognition (ML *r* =.35, *p* =.021; EAL *r* =.31, *p* = .011*)* were significant and considered moderate.

4.8 Discussion

This study investigated whether knowledge of more than one language enhanced the ability to learn novel vocabulary items in an explicit instruction task (RQ1), and whether existing vocabulary knowledge was associated with word learning ability (RQ2).

Key findings included that children with EAL performed significantly better than their monolingual peers at recall immediately after vocabulary training. Both groups had a significant drop in recall performance after a delay of one week, compared to the immediate post-test, with no significant difference between groups evident at delay, suggesting that initial memories were not robust for either group.

4.8.1 Research Question One

Our first research question concerned whether knowledge of more than one language (those with EAL) enhanced the ability to learn novel words through an explicit word learning paradigm, in comparison to monolingual children.

The initial advantage of recall in EAL children may be attributed to a phonological advantage consistent with the view that bilingualism can facilitate some areas of phonological processing (e.g. Bialystok, Majumder, & Martin, 2003; Bruck & Genesee, 1995; Verhoeven, 2007). In this study, we found a significant, moderate correlation with performance on nonword repetition and immediate recall for the children with EAL but not for the monolingual group. This suggests that for EAL children, there was a relationship between the ability to recall novel words and phonological short term memory. Children's bilingual experience may influence their linguistic awareness leading to improved phonological awareness, In addition to the family's first language (Bialystok et al., 2003; Bruck & Genesee, 1995; Verhoeven, 2007), other factors including the family literacy environment (Chaney, 1994) and the family's socioeconomic status (Bryant, Maclean, Bradley, & Crossland, 1990) are likely to affect phonological abilities for both EAL and ML children, and the interaction between these factors is complex and intertwined. However, evidence exists that a bilingual phonological advantage can still hold strong in children from poorer backgrounds (Dickinson, McCabe, Clark–Chiarelli, & Wolf, 2004), suggesting that knowledge of more than one language influences phonological awareness above and beyond factors associated with socio-economic status.

In the current study, we attempted to recruit children from similar areas of deprivation. All children attended schools in areas of multiple deprivation ranked three or lower (see Chapter 3). This accounts for the most deprived 30% of postcodes within the UK. Since both groups were from similar socio-economic backgrounds, we suggest the EAL recall advantage stems from an enhanced phonological system based around their knowledge of more than one language. This adds further evidence that bilingual phonological advantages can occur irrespective of socio-economic status (Dickinson et al., 2004). The phonological advantage for immediate recall which was seen initially for EAL children did not lead to an advantage after a one week delay, suggesting the advantage is a benefit to initial form learning, but not consolidation. The lack of long term advantage, despite the initial benefit, could be a function of the more limited initial English vocabulary which was seen on the baseline tests for EAL children.

Successful word learning requires knowledge of the lexical, phonological and semantic representations of the word (e.g. Gupta & MacWhinney, 1997), which is then cross referenced with real world knowledge before integration occurs. One possible explanation for the pattern of results for EAL children is that their enhanced phonological awareness enables them to encode and retain the phonological form more easily than ML children initially. However, long term lexical consolidation relies upon aspects of word learning beyond phonological encoding, for which EAL children may not possess an advantage. It is important to note, however that at T2, both groups demonstrated similar levels of recall. Thus, EAL children did not show any evidence of a word learning disadvantage when learning during an explicit learning task.

The limited and isolated nature of exposure to the novel words may account for the decay in learning for both groups of participants over a week. The Complementary Learning Systems Account (Davis & Gaskell, 2009; McClelland et al., 1995) (see Chapter 1) assumes the first exposure of a nonword creates limited knowledge in the short-term hippocampus. Consolidation is then needed for long-term memory of the word to occur in the neocortex. Initial word learning may be reliant upon learning the phonological representation of words (e.g. McMurray, Horst & Samuelson, 2012). For consolidation into long term memory to occur, multiple exposures are probably required, as multiple factors are needed to provide a full lexical entry. Such factors include the ability to retain phonological information in the short term, while permanent representations are constructed (i.e. the phonological loop capacity; Baddeley, Gathercole, & Papagno, 1998), as well as the ability to retain the word meaning (semantic representation) and then a link between the two; a phonological to semantic link (the receptive link) and a semantic to phonological link (the expressive link) (Gupta & Tisdale, 2009). This type of information is usually built up incrementally through multiple exposures and contexts, which is difficult to reproduce under experimental conditions. Both groups in this study showed decaying of both recall and recognition over time, and this is likely because the training employed here did not facilitate the deeper learning required for long term retention. Novel word learning studies such as this are undoubtedly useful in enabling us to establish the learning that can occur under minimal conditions. However, this type of word learning is very different from naturalistic word learning where exposure is repeated and contextually diverse. Nation (2017) argued that exposure to vocabulary in a multitude of contexts (such as through reading), provides robust lexical representations and lexical quality. Multiple exposures to novel words in differing contexts have been found to be more beneficial to lexical integration than exposures through the same context (Henderson & James, 2018). Since the learners in this study had no additional input of the novel words between T1 and T2, it seems likely that the steep decay over time observed here is not emblematic of real word learning.

Although experimental word learning studies do not enable the learners such rich and varied encounters with the new word forms, they are useful as we can evaluate how learning occurs in minimal conditions. As word learning is a multi-faceted process, we would not expect synthetic initial word form learning studies to explain this process in its entirety. However, the findings of this study suggest that having more than one language can be beneficial for the phonological aspects of word learning, although this advantage needs to be harnessed so that short term learning is consolidated effectively. In relation to this, when considering the emerging literature regarding the positive effects of bilingualism on novel word learning in adults (e.g. Kaushanskaya, 2012; Kaushanskaya & Marian, 2009a, 2009b) and in children (Kaushanskaya et al., 2014), it is important to keep in mind also that these advantages may not necessarily extend to all types of word learning. Kaushanskaya et al., (2014) found that advantages in novel word learning were only present when the task was akin to L2 learning, i.e. mapping unfamiliar novel words onto familiar referents (animals). When the task involved mapping novel items onto unfamiliar referents (aliens), the word learning advantage was lost. The authors attribute the bilingual advantage to lexical acquisition rather than a broader advantage in the realms of verbal memory, which is in line with findings of the current study. A general verbal memory advantage should have resulted in advantages across novel words in both familiar and unfamiliar referents, but this was not found. This suggests that the bilingual learning advantage was a result of the experience of second language acquisition, whereby children were well practised in the domain of acquiring a new label for a previously known concept. Studies of infants exposed to more than one language suggests the mutual-exclusivity bias (most commonly documented in monolingual infants) is diminished (Byers-Heinlein & Werker, 2009; Davidson et al., 1997). Bilingual children, with experience of multiple labels for one referent, are more inclined to assume that novel words can be mapped to known objects.

Although studies of mutual exclusivity bias and Kaushanskaya et al. (2014) suggest novel label acquisition, they have not tested for longer term retention. Kaushanskaya et al. (2014) measured only novel word recognition. In the current study, we found effects close to ceiling for novel word recognition across both monolingual and EAL children, suggesting the task was easy. Immediate and delayed post-tests of both recall and recognition convey a more reliable picture of word learning. Kaushanskaya et al., (2014) did not administer delayed post-tests, therefore we are unable to ascertain whether long term consolidation occurred for either the familiar or unfamiliar referents. The present study adds to the emerging body of evidence that word learning advantages may exist for children with knowledge of two or more languages.

We found no evidence of a difference in semantic learning between EAL and ML children. Syntactic structures in English often place the adjective in a prenominal position, requiring the adjective to be processed and stored prior to hearing the noun. This may have implications for the semantic meaning of the adjective. Some adjectives can have multiple meanings, for example, 'great' can mean refer to both quality '*the great English poet'* and amount '*this poem is of great interest'.* The listener is required to process and store the adjective and then disambiguate the meaning upon hearing the noun. In the current study, an additional complexity was the use of three prenominal adjectives '*a big, brown, dangerous dog'.* Although no adjectives had multiple meanings, they did require processing and storage prior to hearing the noun. As this study was a direct replication, no changes were made to the novel word definitions, however, the task may have been more complex for those with a poorer working memory. As we did not control for WM as a baseline measure, we were unable to co-vary WM skills during our analysis, which is a clear limitation. Future studies should include WM tasks at baseline to account for processing skills during novel word definition learning.

4.8.2 **Research Question Two**

Our second research question sought to determine whether baseline English vocabulary knowledge contributed to novel word learning ability. To test this theory we examined the association between our experimental measures and standardised measures of receptive and expressive English vocabulary.

Results from the baseline tests of vocabulary were consistent with the existing literature (e.g. Mahon & Crutchley, 2006; Murphy, 2014) suggesting that children with EAL have a significantly smaller English receptive and expressive vocabulary during primary school than their ML peers.

For both groups (ML/EAL), baseline vocabulary scores correlated only moderately with the training phase of our experiment, when children were required to freely recall novel words when presented with the associated visual stimuli. There was no evidence of a larger association for ML children, despite the fact that they had a significantly larger baseline vocabulary overall. Ability to learn novel words may therefore be associated with learning potential rather than static vocabulary knowledge. Static vocabulary knowledge refers to the amount of vocabulary that children know at the point of testing. However, static assessments do not reflect children's ability to learn words. Although word learning studies suggest that underlying vocabulary knowledge relates to word learning ability in children (Penno, Wilkinson, & Moore, 2002) this assumption can be problematic for children with EAL who will enter school with lower level language skills than their monolingual peers. Our measure of explicit learning may be more sensitive than static measures of language for EAL children as it can measure children's potential to learn language rather than their current knowledge, which may be limited by reduced exposure to English.

Existing vocabulary knowledge, however, could have a greater impact on learning new words introduced implicitly and acquired through contextual cues, as comprehension may be hindered by too many unknown words (e.g. Ouellette, 2006). It is important to test this in children with EAL as most vocabulary acquisition occurs implicitly (Nagy & Herman, 1987). The findings of this study suggest that baseline receptive and expressive vocabulary knowledge are not an intrinsic element to novel word learning ability, when the medium of acquisition is explicit.

4.9 Conclusion

Results from the present study suggest that children with EAL have an immediate advantage when recalling the phonological form of novel words, despite having a smaller English vocabulary. The outperformance of EAL children at novel word recall supports evidence of a word learning advantage for multilingual speakers (e.g. Kaushanskaya, 2012; Kaushanskaya & Marian, 2009a, 2009b). Whilst a word learning advantage has been documented in bilingual adults, and in English speaking children with school exposure of Spanish (Kaushanskaya et al., 2014) this is the first study to suggest an advantage of phonological word learning could be extended to children in the UK with English as an additional language.

Previous studies have found that adult bilinguals maintained their word learning advantage after a delay of seven days on recall and recognition (e.g. Kaushanksaya & Marian, 2009a; Kaushanskaya & Marian, 2009b). However, no such studies have measured lexical consolidation of nonwords in bilingual children. This study did not find a long term lexical recall advantage for children with EAL, which highlights the importance of repeated testing in experimental studies to verify whether learning is robust over time.

4.10 Future directions

While we know that EAL children may be advantaged when explicitly taught novel words, much of vocabulary learning in children occurs implicitly (Nagy & Herman, 1987). Evidence suggests that children with EAL struggle with both listening and reading comprehension (McKendry & Murphy, 2011). Consequently, it is possible that EAL children may find it difficult to acquire new vocabulary through the mediums of listening or reading, because of the relationship between comprehension and existing vocabulary knowledge. The next chapter will address this, introducing novel words to EAL and ML children through a spoken story.

Chapter 5: Incidental vocabulary acquisition while listening to stories. What is the effect of language status?

5.1 Introduction

Listening to stories during childhood delivers not only advantages in terms of educational attainment (Scarborough & Dobrich, 1994) but also advantages in social and emotional development (Baker, 2013). Listening to or reading stories promotes later academic success (Rimm-Kaufman & Pianta, 2000; Whitehurst et al., 1988) and can be a bonding experience between parents and children.

Specific advantages gained from oral storytelling have been seen in literacy development (Lonigan, Shanahan, & Cunningham, 2008; Whitehurst & Lonigan, 1998), and more frequently in early vocabulary development (Farrant & Zubrick, 2013; Hammer, Farkas, & Maczuga, 2010; Henderson, Devine, Weighall, & Gaskell, 2015; Hepburn, Egan, & Flynn, 2010; Nagy et al., 1987; Ricketts, Bishop, Pimperton, & Nation, 2011; Sénéchal, 1997; Sénéchal, Pagan, Lever, & Ouellette, 2008; Wilkinson & Houston-Price, 2013; Williams & Horst, 2014). However, there are substantial individual differences in children's ability to implicitly infer the meanings of new words encountered through stories (Biemiller & Boote, 2006; Mol et al., 2008) which may be as a result of the variability in children's vocabulary sizes (Henderson et al., 2015; Karweit & Wasik, 1996; Wilkinson & Houston-Price, 2013).

Vocabulary size and reading skills have a reciprocal relationship (Beck et al., 2013; Nation, 2001; Qian, 1999, 2002; Stahl & Fairbanks, 1986). The more vocabulary a child knows, the more able they are to comprehend text, and consequently decipher the meanings of unknown words using contextual cues (Day et al., 1991; Jenkins et al., 1984; Nagy et al., 1985), thus further bolstering their vocabulary (Justice et al., 2005; Penno et al., 2002; Wilkinson & Houston-Price, 2013). Early vocabulary size is influenced by the amount of print a child is exposed to (Farrant & Zubrick, 2013; Sénéchal, 1997; Sénéchal et al., 2008), and print exposure in the home may even alleviate the risks of socio-economic status on oral language development (Payne, Whiteside & Angell, 1994).

For children who are yet to become skilled readers, oral language experience such as listening to stories is an excellent way to encounter a variety of new vocabulary (Biemiller, 2003), as stories give children the opportunity to access vocabulary items that do not frequently occur in speech (Cunningham & Stanovich, 1998).

5.2 Incidental learning

Acquiring vocabulary while reading or listening to stories can be categorised as incidental learning. This is because the child is focused on reading and comprehension rather than the task of learning vocabulary (Hulstijn, 2001). Although direct instruction is beneficial to vocabulary learning (see Chapters 2 and 4), the majority of new words are naturalistically acquired from incidental exposures, such as conversations with adults or peers, or from television or video clips (Akhtar, 2004; Elley, 1989; Henderson et al., 2015; Houston-Price, Howe, & Lintern, 2014). Before children are formally trained in literacy, they can acquire vocabulary incidentally through listening to stories (e.g. Justice et al., 2005; Nagy et al., 1987; Sénéchal & Cornell, 1993; Waisk & Bond, 2001; Wilkinson & Houston-Price, 2013).

Older children have also been found to benefit from oral storytelling (Dickinson, 1984; Elley, 1989; Nagy et al., 1987; Penno et al., 2002; Robbins & Ehri, 1994). In fact, studies have shown that listening to stories can contribute to vocabulary growth even if it is not accompanied by explanations of word meanings (Elley, 1989). Learning vocabulary in this manner can lead to long term lexical integration (Dickinson, 1984; Elley, 1989; Sénéchal & Cornell, 1993).

By school onset, the contribution from incidental exposure to vocabulary growth is mainly thought to originate from written text (Jenkins et al., 1984; Nagy et al., 1987). This is because, as the child's reading ability improves, so does their ability to implicitly learn vocabulary that they encounter in texts (Valentini, Ricketts, Pye, & Houston-Price, 2018).

During primary school, children's vocabulary grows substantially (Anderson & Freebody, 1981; Beck et al., 1982; Penno et al., 2002; Robbins & Ehri, 1994). Estimates of children's vocabulary size vary (e.g. Nagy & Anderson, 1984; Biemiller & Slonim, 2001), with some researchers suggesting that incidental learning contributes to vocabulary growth more so than instructed vocabulary (Jenkins et al., 1984; Nagy et al., 1987, 1985). However, individual differences exist in children's ability to learn new vocabulary incidentally (Biemiller & Boote, 2006; Mol et al., 2009), and various factors influence whether children can learn the meanings of words encountered in this way.

5.3 What influences ability to learn new words from incidental exposure?

Studies have shown that children can learn to infer the meanings of words from context if they have been trained in how to do so (Carnine et al., 1984; Carroll & Drum, 1983; Nash & Snowling, 2006, Patberg, Graves, & Stibbe, 1984; Sternberg, 1987; Sternberg & Powell, 1983). However certain factors can influence the child's ability to use context to deduce the meanings of new words (Carnine et al., 1984). Factors such as whether or not the child has been pre-taught any of the vocabulary occurring within the story, whether definitions or explanations are given to the children during reading, (Elley, 1988, 1989) the class of words being learned (Elley, 1989), what type of story is being heard (Elley, 1989; Leung, 1992) and the frequency of vocabulary occurring in the story (Stahl & Fairbanks, 1986).

Furthermore, children find it easier to learn words from context if the connection between the word and the cue are not far apart in the text (Carnine et al., 1984). Evidence also suggests that word type can be influential in how easily it is acquired. For example, different word learning trajectories have been found for nonwords, familiar words and homonyms (Mazzocco, 1997), with younger children struggling to decipher the meanings of homonyms from context compared to nonsense words (Mazzocco, 1997).

To gain more than just a temporary representation of the word form, there is a need for multiple repetitions, which could take the form of multiple repetitions of novel words within the same story, or across differing story contexts (Beck, McKeown & Kucan, 2002; Elley, 1989; Justice et al., 2005; Penno et al., 2002; Séncéhal, 1997).

Multiple reading sessions can also increase the ability to learn novel words from stories. For example, Horst, Parsons, and Bryan (2011) carried out an experimental study of word learning through listening to stories. Children aged three were exposed to three stories, with the same number of exposures to novel words, however children in one condition listened to the same story three times, while others listened to different stories with the same novel words. Results showed a significant advantage of word learning for children who listened to the same stories over the course of one week. This, the authors suggest, is a result of the reduced cognitive demand of the task, leading to better lexical integration.

Embedded definitions of words within texts have also led to fruitful learning gains while listening to stories, which may even narrow the gap between those with richer and poorer vocabularies (Coyne et al., 2004). This is because explicit definitions may benefit children with smaller vocabularies (Justice et al., 2005).

5.4 Vocabulary growth for EAL children through stories

As stories are such an important pedagogical tool, it is of little surprise that they play an important role in interventions to boost the vocabulary of children with EAL (see Chapter 2). Growth in vocabulary can occur when definitions for vocabulary items are embedded into the text (e.g. August et al., 2016; Collins 2016; Vadasy & Sanders, 2015b), however when this is accompanied by contextual information and adult led discussion, growth can be larger (August et al., 2016; Crevecoeur et al., 2014; Vadasy & Sanders, 2015b). Additional support in the form of multimedia video clips also boosted vocabulary acquisition of words encountered in texts (Silverman & Hines, 2009). This suggests that EAL children can learn vocabulary through stories when definitions are given, however the addition of contextual cues and adult led support may be more beneficial to children with smaller English vocabularies. This is in line with research carried out on monolingual children with differing initial vocabularies (Coyne, et al., 2004; Justice et al., 2005). However, arguably when such explicit features are embedded within storybook sessions, learning may not be considered implicit, as the learner's attention will be drawn to the task of learning word forms (Hulstijn, 2001).

5.5 The current study

The current study extended the paradigm used in study 1 to investigate children's ability to learn six novel words implicitly while listening to stories. Building on previous research, novel words were used, rather than existing words (Bornstein & Mash, 2010; Sénéchal, 1997; Sénéchal & Cornell, 1993) which were only nouns (Robbins & Ehri, 1994) and each novel noun was repeated multiple times (Robbins & Ehri, 1994).
The first aim of the study was to investigate the relationship between baseline vocabulary scores and implicit word learning ability. The second aim was to find out whether novel word learning ability differed between groups (ML/EAL). This was measured through the children's abilities to acquire novel words that were embedded in stories they heard.

Based upon the previous study (see Chapter four) we may expect children with knowledge of more than one language to have a novel word learning advantage. However, since it has been established that ability to use contextual cues to infer the meanings of new words is related to baseline vocabulary knowledge (e.g. Wilkinson & Houston-Price, 2013) and (some) EAL children have smaller English vocabularies (e.g. Mahon & Crutchley, 2006), it may be that ML children have the novel word learning advantage. No studies to date have investigated word learning differences between ML and EAL children through implicit story listening tasks.

The research questions for the current study were twofold:

1. What is the effect of language status (EAL vs. monolingual) on novel word learning ability during an implicit task?
2. What is the effect of existing English vocabulary size on novel word learning during an implicit task?

5.6 Methods

5.6.1 Participants

Participants were 50 EAL children (29 female; 21 male) and 30 ML (16 female; 14 male) recruited from two primary schools in West Yorkshire. These children did not take part in any other experiments in this thesis. Schools were sent information packs and consent forms prior to testing and parents were sent letters informing them of the study.

Both schools were ranked as ‘good’ by Ofsted. Schools were approximately two and a half miles from each other and in the suburbs of a large city.

School A was a larger than average sized primary school, with a higher than average proportion of pupils coming from minority ethnic groups. The proportion of children for whom English is an additional language was also above average.

School B was a larger than average sized primary school with pupils coming from a very wide range of ethnic groups. Less than 10% of the school population were White British. The proportion of pupils with EAL was well above the national average.

Testing began in January 2018 for a four-week period by the first author and five undergraduate research assistants. Every effort was made to ensure that schools were matched to areas of similar socio-economic status. Schools were asked to provide information about the home language of the pupils (see table 11), their dates of birth (see table 12) and whether the children had any special educational needs or disabilities which may hinder them taking part in a language learning experiment. One child was eliminated from participation due to having a suspected special educational need. Schools were additionally asked to provide information about how long the pupils had been at school in the UK. One child was eliminated from the study for being in the UK less than one month, as his level of English was too low to comprehend the task. An additional five participants were eliminated due to having incomplete data sets, and one participant was eliminated for behavioural issues during testing, resulting in a final sample of 50 EAL children and 30 ML children. Participants additionally included one set of female identical twins.

An independent samples t-test identified that there was no significant difference between groups (EAL and ML) in terms of age in months (t (78) = 1.55; p = .125)

Table 11 *Languages spoken by EAL pupils (n=45)*

Language (L1)	**N**
Arabic	9
Urdu	8
Farsi	5
Kurdish	4
Portuguese	3
Punjabi	3
Tigrinya	3
Wolof	2
Bantu	1
Bengali	1
Bulgarian	1
French	1
Hindi	1
Indonesian	1
Jamaican Creole	1
Japanese	1
Lithuanian	1
Shona/Zulu	1
Somali	1
Thai	1

Table 12 *Demographic information about children*

School	**ML**	**EAL**	**Gender (M/F)**	**Age(months)**
A	7	38	17/28	94.93
B	23	12	18/17	95.74
Total	30	50	35/45	

5.6.2 **Baseline measures**

Baseline measures carried out in experiment one (see chapter 3) were administered to children in experiment two. These were measures of receptive and expressive vocabulary, nonverbal reasoning and non-word repetition.

5.6.3 **Design**

The novel word learning experiment took place in two sessions, one week apart. In session one (T1) children listened to two stories via headphones. Each story contained three novel animal words. The novel words were the same as those used in experiment one. Stories were adapted from Henderson and James (2018), in which repeated reading of stories including novel words were presented to monolingual children. Two stories were adapted for this experiment (see appendix 8). Story A contained three novel words from block A of study one (see chapter 4) and story B contained the novel block B words. In experiment one, it took approximately eight repetitions of words in Block A and eleven repetitions of words in block B before criterion was reached (all three words recalled correctly on two consecutive occasions). For that reason, story A included eight repetitions of the novel words and story B contained eleven repetitions. Previous literature would deem these exposures to be sufficient for children of this age group to acquire the novel words (see Robbins & Ehri, 1994).

The previous experiment included a definition of the animals prior to explicit vocabulary training. In order for vocabulary acquisition to be implicit, children must not be aware of their learning, while they are focused on another task (in this case listening comprehension). Therefore, in order to replicate implicit learning, the children were not given pre-exposure to the novel words before hearing the story, as this may highlight the intention of the experiment and consequently it would not be a true implicit learning study. Instead, the definitions were embedded into the story, without explicitly naming the animal referent. Children resultantly had to infer the animal referent based upon the semantic information used in the definitions (see Table 13).

At time one, children were told that they were going to listen to a story with some 'funny sounding words' and they had to listen to the story carefully. They were not told that they would have to retain information on the novel words for later. Stories were recorded by a female native speaker. Recordings were cut to eliminate extraneous background noise. They were then normalised using Audacity software (Audacity team, 2012), ensuring all sound clips were at the same volume. Children listened to the stories via headphones in a quiet area in school. For each story there was a picture which included three novel animals (see Figure 8). To test children's fast mapping from listening to stories, we tested children's immediate recall and recognition for the novel words immediately after listening. To test children's slow mapping from listening to stories, approximately one week later we tested children's retention for the novel words through the same recall and recognition tasks. To test children's semantic knowledge of the novel words, we administered an immediate post-test in which children heard the novel animal label, and were asked to define it.

Figure 8 *Image children were presented with for story A*

Each story was approximately four minutes long. The stories were split into four parts, each approximately one minute long, and children would be prompted with a screen which asked ‘shall we find out what happens next?’ after each section. This was to ensure that children remained focused on the task. Stories were adapted from Henderson and James (2018), and novel words were changed to replicate study 1 (chapter 4). Despite this adaptation, stories remained of a similar in length to the original Henderson and James paper. As the current study was carried out with slightly younger children (7-8 years, compared to 10-11 year olds), two primary school teachers checked the stories and confirmed they would be appropriate for this age group. Scripts for the stories can be found in appendix 8.

Immediately after listening to a story, children took part in three post-tests to measure their knowledge of the novel items. Immediate post-tests were definition knowledge, immediate recall and immediate recognition (as described in Chapter 4). Tests were carried out using DMDX software (Forster & Forster, 2003). Test recordings were carried out by the same female native speaker reading the stories.

Table 13 *Novel words embedded into stories*

Novel Animal	Original definition	Story definition
Goni	A sad, blue, red haired fish	She saw a sad goni with its blue scales and bright red hair, swimming around its tank
Fybe	An orange, striped, sleeping cat	The purring fybes were fast asleep on a cosy cushion She loved its orange fur, and stripy back
Salu	A big, brown, dangerous dog	She kept a look out for the big, brown salu Dad shouted for Lucy to be careful, the salu was dangerous
Targeli	A fat, white, spotted cow	Jack heard the spotted, white targeli mooing The targeli must have been eating lots and lots of grass, thought Jack, he was quite fat indeed!
Pimut	An old, grey, singing bird	The old Pimut would surely be flying in the sky The grey Pimut was the first to fly up on to the stage. Using her beautiful voice, the Pimut chirped sweetly
Mafyk	A green, dotted, poisonous snake	The poisonous Mafyk was bright green and covered in dots Using his long, slithering body, the Mafyk tied himself into a knot

5.7 Results

5.7.1 Baseline measures

As with study one (see Chapter 4), age based standardised scores were calculated for monolingual children across all language measures. Following the same exclusion criteria as experiment one, monolingual children who scored one standard deviation below the mean across two out of three language measures were excluded due to potential language disorders. Unlike study one, no children fell into this exclusion category for the current experiment, therefore results reflect the full sample of data collected.

An independent samples t-test was carried out to assess whether group differences (EAL; ML) existed in terms of baseline expressive and receptive vocabulary, phonological memory and intelligence. Raw scores were used for the statistical assessment, due to standardised scores for all measures being normalised with a mainly ML population.

From an independent samples t-test carried out to compare the means of EAL and monolingual pupils, there was a significant difference between groups on the standardised measures of expressive and receptive vocabulary. Receptive vocabulary for monolingual pupils was significantly higher ($t(78) = 6.33$, $p < 0.01$,) than EAL pupils. Expressive vocabulary for monolingual pupils was also significantly higher ($t(78)= 4.35$, $p <0.01$) than EAL pupils. There was an additional significant difference in means on a further baseline measures of phonological short term memory (nonword repetition) with ML pupils scoring significantly higher ($t(78) = 2.46$, $p =.02$) than EAL pupils. This may be due to the measure used (CNRep), following the phonotactics of English, which may have disadvantaged the children for whom English was an additional language.

This was a different finding from study 1 (see chapter 4), in which EAL children and ML children did not differ significantly on non-word recall. We attribute this to children from study 1 coming from areas of high social deprivation which may have contributed to poorer language skills (see Hart & Risley, 1995). Raw non-word repetition scores for monolingual children were greater in the current study (M =34.50, SD=9.76) than those of study 1 (M= 30.00, SD = 4.38), which may be why differences between groups were found. Non-verbal reasoning was the only baseline measure for which there was no significant difference between groups (t (78) = .82; p = .41).

Table 14 *Descriptive statistics for baseline measures*

	Max. Score	Mean		***p***	Cohen's d
		ML	**EAL**		
Receptive vocabulary	168	115.53 (16.66)	92.6 (15.05)	< 0.01	1.44
Non word repetition	40	34.50 (9.76)	30.70 (3.82)	0.02	0.51
Non-verbal reasoning	24	11.93 (4.32)	11.16 (3.93)	0.41	0.19
Expressive vocabulary	54	38.37 (7.31)	29.86 (9.08)	< 0.01	1.03

5.7.2 Research Question 1

Research question one investigated the difference in the ability of ML and EAL children to learn novel words during an experimental task. Descriptive statistics for experimental measures can be seen in Table 15.

Table 15 *Descriptive statistics for experimental measures*

Measure	Max. Score	Mean	
		EAL	**ML**
Definition Knowledge	24	5.94 (5.04)	7.50 (4.72)
Immediate Recall	6	1.00 (1.13)	1.90 (1.47)
Delayed Recall	6	0.28 (0.54)	0.37 (0.72)
Immediate Recognition	6	2.72 (1.85)	3.30 (1.47)
Delayed Recognition	6	1.94 (1.33)	2.47 (1.61)

Definition knowledge

An independent samples t-test revealed no significant differences (t(78) =1.37; p=.174) between EAL and ML children on their ability to recall the semantic attributes of the novel words.

Recall

A mixed design 2x2 ANOVA was carried out to assess the impact of delay language groups with Session (Recall1, Recall2) as a within-subjects factor and Group (ML, EAL) as a between-subject factor. A significant main effect of group was found for recall ($F(1, 78) =94.85$; $p < .01$; $\eta^2 =.09$) and time ($F\ (1, 78) = 65.39$; $p < .01$; $\eta^2=.46$) showing that both groups were forgetting over time. The interaction between group and time was significant ($F(1, 78) = 8.52$, $p <.01$) suggesting an advantage for the ML group at immediate recall only. Consequently, two post-hoc independent samples t-tests were then conducted to test group differences at immediate and delayed recall (ML; EAL) with a Bonferroni correction for multiple comparisons ($\alpha =.025$). Results showed ML children showed a significant advantage over EAL children on measures of immediate recall ($t\ (78) =3.08$, $p < .01$) but no significant difference occurred after a delay of one week (t (78)=.62 , p =.540) suggesting a short term advantage of novel word learning, that was not sustained long term. Both groups were approaching floor for novel word recall at T2 suggesting novel word retention from stories is a difficult task for all children, irrespective of their immediate memory for the items.

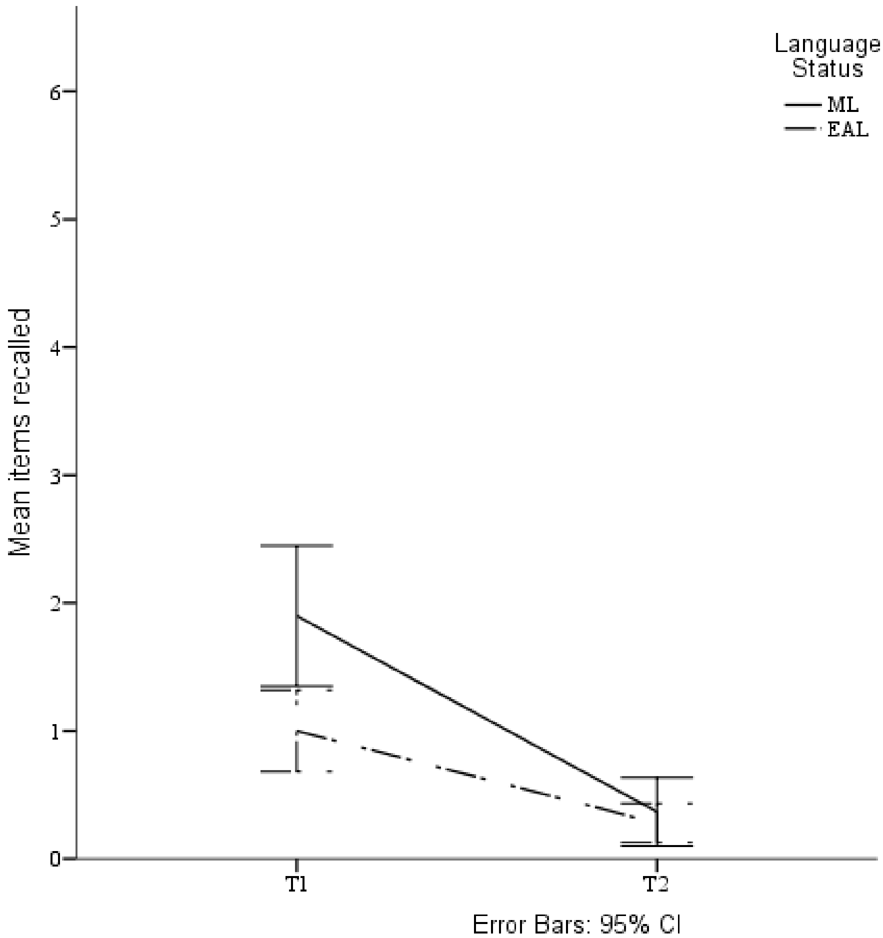

Figure 9 *Recall of novel items immediately (T1) after story and after a one week delay (T2).*

Due to a significant difference on baseline scores of phonological memory between groups, a further one-way analysis of covariance was carried out. The ANCOVA showed that when pre-test phonological memory was co-varied out, the main effect of language status on immediate recall remained significant F(1,77) = 4.61, p = .035, η^2=.06).

Recognition

A mixed design 2x2 ANOVA was carried out to assess the impact of delay across the two groups for recall and recognition with Session (Recognition 1, Recognition 2) as a within-subjects factor and Group (ML, EAL) as a between-subject factor. There was no significant main effect was found for group (F(1, 78) =.3.01; p =.087, η^2= .04). A significant main effect of time was observed for recognition (F(1, 78) = 19.96, p < .01) showing that both groups were forgetting over time. The interaction between group and time was not significant for recognition (F(1, 78) = .022, p = .883) suggesting rate of forgetting was similar across both groups.

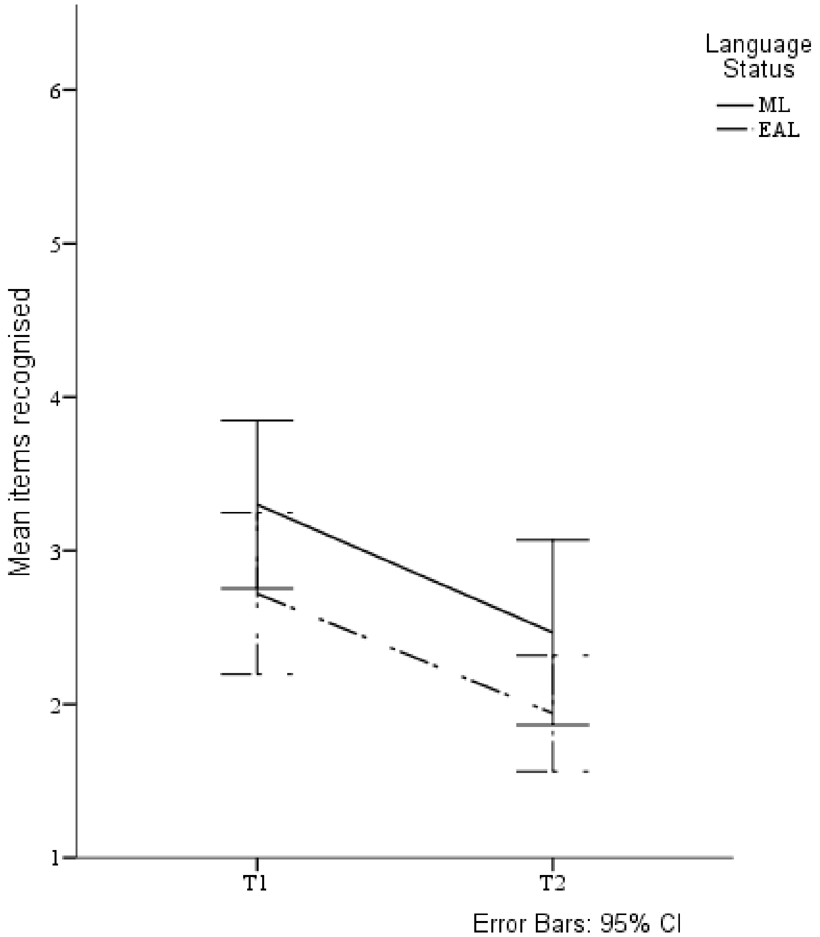

Figure 10 *Recognition of novel items immediately (T1) after story and after a one week delay (T2).*

5.7.3 **Research Question 2**

Research question 2 investigated the relationship between baseline English vocabulary scores and novel word learning ability. To address this, a Pearson's *r* correlation was carried out for the whole group (ML and EAL) (Table 16).

Table 16 *Pearson's r correlations for whole sample*

	1	2	3	4	5	6	7	8
1. **Definition Knowledge**								
2. **Immediate recall**	.30**							
3. **Delayed recall**	0.10	.34**						
4. **Immediate recognition**	.51**	.48**	.27*					
5. **Delayed recognition**	.40**	.56**	.45**	.54**				
6. **BPVS-III**	.32**	.38**	.28*	0.18	.38**			
7. **CELF-IV**	.37**	.38**	0.22	.23*	.28*	.73**		
8. **WASI-II**	0.19	0.22	.24*	.28*	0.22	.29**	.23*	
9. **CNRep**	.25*	.41**	.30**	0.21	.32**	.42**	.43**	.25*

*p < .05 (two tailed) **p < .01 (two tailed)

Table 17 *Pearson's r correlation for ML sample*

	1	2	3	4	5	6	7	8
1. **Definition Knowledge**								
2. **Immediate recall**	0.17							
3. **Delayed recall**	-0.03	0.33						
4. **Immediate recognition**	.48**	.43*	0.06					
5. **Delayed recognition**	0.18	.57**	0.35	.52**				
6. **BPVS-III**	.39*	0.29	.48**	0.22	0.28			
7. **CELF-IV**	0.29	0.25	0.34	0.21	0.07	.68**		
8. **WASI-II**	0.15	.38*	.41*	.45*	0.23	.45*	0.33	
9. **CNRep**	0.21	.44*	.43*	.38*	.43*	.45*	.48**	.49**

**p* < .05 (two tailed) ***p* < .01 (two tailed)

Table 18 *Pearson's r correlation for EAL sample*

	1	2	3	4	5	6	7	8
1. **Definition Knowledge**								
2. **Immediate recall**	.34*							
3. **Delayed recall**	0.18	.34*						
4. **Immediate recognition**	.51**	.50**	.41**					
5. **Delayed recognition**	.53**	.52**	.54**	.54**				
6. **BPVS-III**	0.22	0.22	0.14	0.05	.40**			
7. **CELF-IV**	.36*	.31*	0.13	0.17	.33*	.64**		
8. **WASI-II**	0.19	0.05	0.09	0.18	0.19	0.18	0.16	
9. **CNRep**	0.22	.31*	0.23	0.10	0.22	0.26	.30*	0.11

**p* < .05 (two tailed) ***p* < .01 (two tailed)

Results showed that for the whole sample (ML and EAL), baseline receptive vocabulary correlated with the experimental measures of definition knowledge (r = .32; p <.01); immediate recall (r = .38, p < .01); delayed recall (r =.26; p =.011); and delayed recognition (r = .38; p <.01). The only experimental measure which did not correlate significantly with baseline receptive vocabulary was immediate recognition (r =.18, p =.108).

Expressive vocabulary correlated significantly with definition knowledge (r =.37; p <.01); immediate recall (r = .38, p <0.01), immediate recognition (r=.23, p =.039) and delayed recognition (r =.28; p =.012). This suggests the greater the baseline expressive and receptive vocabulary, the greater the ability to recall both the phonological and semantic representation of the novel items for all participants in the study.

In addition, phonological memory correlated significantly with most measures of experimental word learning, including definition knowledge (r =.25; p =.024); immediate recall (r = .41, p <.01), delayed recall (r =.30; p <.01) and delayed recognition (r = .32; p <.01).

General cognitive ability only correlated with the experimental measures of delayed recall (r =.30; p =.033) and immediate recognition (r =.28; p =.012), suggesting that word learning in this study was not related to nonverbal ability.

However, when the sample was split (EAL/ML), significant correlations were found for the ML children between baseline English receptive vocabulary and definition knowledge (r =.39, p =.031) and delayed recall (r= .48; p =.007), however the correlation between receptive vocabulary and immediate recall, was not significant (r

=.29; *p* =.123), but moderate for the ML group. The non-significance in this case was likely due to the small sample size. For EAL children, there was only one significant correlation between receptive vocabulary and experimental word learning, which was found for delayed recognition (r=.40; p <.01), all other experimental measures had small correlations.

There were no significant correlations between measures of experimental word learning and expressive vocabulary for the ML group, however, although insignificant, correlations ranged from small to moderate for measures of definition knowledge (r =.29), immediate recall (r = .25), delayed recall (r =.34) and immediate recognition (r=.21), so lack of significance may be a result of the small sample size. For the EAL children, there was a positive correlation between expressive vocabulary and measures of definition knowledge (r=.36; p=.011) immediate recall (r = .31, p =.028) and delayed recognition (r=.33; p =.021).

Phonological memory correlated significantly to measures of experimental word learning for ML children, (immediate recall r =.44, p=.014; delayed recall r=.43; p=.019; immediate recognition r = .38, p = .039; delayed recognition r =.43; p =.019) except for definition knowledge (r =.21; p =.256). However for EAL children, phonological memory only correlated significantly with immediate recall (r =.31; p =.027).

5.8 Discussion

This study investigated whether knowledge of more than one language enhanced the ability to learn novel vocabulary items encountered implicitly during a story (RQ1) and whether existing vocabulary knowledge was associated with word learning ability (RQ2).

Key findings included that both overall vocabulary knowledge and phonological memory are an important factor for incidental learning of novel words, as monolinguals, who had a significantly larger baseline English receptive and expressive vocabulary, and phonological memory performed significantly better on an initial measure of recall. Monolingual children were better at initial learning when the learning task was implicit. However, as with study 1, integration was not achieved long term for the measure of recall.

5.8.1 **Research Question 1**

Our first research question investigated the difference between group (ML/EAL) on ability to learn novel words during an implicit task. Children listened to two stories with embedded novel words and then carried out post-tests of definition knowledge, recall and recognition. Results highlighted a ML advantage of immediate recall, however, overall all children displayed poorer recall than the sample in study 1 (see Chapter 4), when the task was explicit. As with study 1, the immediate advantage of nonword recall was not sustained long term. After a delay of one week, results for recall were at floor for both ML and EAL children. This suggests that implicit learning is an especially difficult task with regards to longer term integration (discussed in more detail on page 132).

There was no significant difference between EAL children and ML children’s ability to recall the semantic attributes of the novel words. Both groups were able to recall approximately 25% of the novel word semantic attributes, which would account for around one out of four attributes that they heard embedded into the text. Under direct instruction (see Chapter 4), children were able to recall over 50% of the semantic attributes, which would suggest explicit instruction is a better procedure for embedding semantic information about new vocabulary items.

There was a significant advantage for ML children to freely recall the novel words directly after listening to stories. There are several reasons that could account for such a difference. Firstly, ML children performed significantly better at nonword repetition during baseline testing. This could mean that the ML group had a superior phonological memory and consequently were more able to fast map and recall the novel items. However, when pre-test phonological memory was co-varied out, the main effect of language status on immediate recall remained significant, suggesting that phonological memory was not responsible for the differences in scores.

Yet, encoding is only one part of lexical integration (Diekelmann, Wilhelm, & Born, 2009; Robertson, 2009). For robust lexical integration, children must be able to retrieve new words after a delay (Horst and Samuelson, 2008). Our findings contradict claims that the vocabulary learned through stories is not transient (Dickinson, 1984; Elley, 1989; Sénéchal & Cornell, 1993). In the current study, we found a decline in learning from immediate post-tests to post-tests one week later. Free recall of novel words was at floor after one week, with an average of one word out of six being successfully recalled for EAL children and two words from six being recalled for monolingual children at immediate post-test. For recognition, both groups displayed a similar rate of forgetting over one week. Recognition scores were not at ceiling during this task, unlike study 1 (see Chapter 4), which provides more evidence that vocabulary acquisition under implicit conditions is more difficult for all children. This could be as a result of the children only hearing the story on one occasion (Horst, Parsons, & Bryan, 2011; Williams & Horst, 2014). Another reason could be the lack dialogic techniques used with nonword definitions embedded into the texts. Giving definitions during stories has been shown to enhance vocabulary acquisition. For example, Biemiller and Boote (2006) suggest that giving definitions when unknown words occur in the text may help children's learning simply by bringing their attention to the new vocabulary. In the current study, full definitions of animal type were not given, as the task was investigating incidental learning rather than explicit instruction, but contextual cues were embedded. Furthermore, children listened to pre-recorded stories via headphones and researchers did not provide any additional instruction or discussion of the story after listening took place. This may be why children in both groups decayed in their knowledge of nonwords in the week after testing took place.

In sum, children with EAL were found to be disadvantaged compared to monolingual children on a measure of free recall of novel words immediately after testing. There were no significant differences between children's ability to define or recognise the novel words, although monolingual raw scores were higher on all occasions.

Both groups decayed significantly in their knowledge of nonwords over a week, both to recall and recognise them. This resulted in floor effects for novel word recall. This highlights the importance of delayed testing to confirm learning in experimental studies of word learning. Immediate post-tests, or post-tests after a short delay may not be enough to capture true lexical integration effects.

5.8.2 **Research Question 2**

The second research question addressed whether existing vocabulary knowledge was associated with word learning ability. A Pearson's r correlation revealed significant correlations between both expressive and receptive vocabulary, novel word definition knowledge and immediate recall across the whole sample of participants. This is in line with previous research (Dockrell, Braisby, & Best, 2007; Ewers & Brownson, 1999; Joshi, 2005; Penno et al., 2002; Robbins & Ehri, 1994; Sénéchal et al., 1995) documenting a "Matthew Effect" (Stanovich, 1986), where children with the largest vocabularies are able to make larger word learning gains from stories.

Although previous research has indicated that vocabulary learning can occur through storybook reading for EAL children under intervention conditions (e.g. August et al., 2016; Collins, 2010; Crevecoeur et al., 2014; Pollard-Durodola et al., 2016), the growth can be larger for ML children (Crevecoeur et al., 2014). Since ML children tend to have larger English vocabularies than EAL children (e.g. Bialystok et al., 2009; Hutchinson et al., 2003; Mahon & Crutchley, 2006; Oller & Eilers, 2002; Portocarrero et al., 2007), a clear argument is that vocabulary knowledge is a significant predictor of vocabulary growth (Robbins & Ehri, 1994; Sénéchal, Thomas, & Monker, 1995). As in study 1, (see Chapter 4) children with EAL in the current study had a significantly smaller receptive and expressive vocabulary, despite being matched on non-verbal reasoning. Monolingual children's initial advantage of novel word recall could be as a result of their larger baseline receptive and expressive vocabularies.

Horst, (2013) argues that children with smaller vocabularies benefit from the same stories being read on multiple occasions, as the repetition of the narrative lowers the cognitive demands of the word learning task. As a result, the child has more cognitive resources available to encode the new semantic and phonological information. However, the generalisability of the effects of repeated readings to children of differing vocabulary levels is questionable. Karweit and Wasik (1996) found that while benefits were found for children with poorer vocabulary, who were able to increase their comprehension of the story with each additional exposure, those with larger vocabularies showed an opposite trend. Thus, children with EAL, who have a tendency for smaller vocabularies than their monolingual peers (e.g. Mahon & Crutchley, 2006), may have benefitted from repeated readings of the stories to improve their comprehension levels. For monolingual children, it may have been beneficial to repeat the novel words across multiple stories, so that the children could understand the word meanings across multiple contexts.

Robbins and Ehri (1994) posit a reciprocal relationship between baseline vocabulary knowledge and ability to learn vocabulary through stories. For example, those with existing larger vocabularies may comprehend stories with greater ease, and consequently enjoy reading and read more, resulting in greater exposure to a variety of vocabulary. Whereas children who have smaller vocabularies may find comprehension more cognitively demanding, therefore read less and having less exposure to text and new vocabulary (Stanovich, 1986).

It may be that children with larger vocabularies had a greater ability to use contextual cues and were more able to comprehend the story (Robbins & Ehri, 1994). As a result, these children had a richer knowledge base which led to a heightened ability to infer the meanings of new words. This provides further support for repeated readings of the same stories to reduce the linguistic demands of the task, creating more capacity for word learning (Horst, 2013).

In addition, Robbins and Ehri (1994) suggest that experience of listening to stories may have factored into novel word learning ability. They proposed that children with less experience of listening to stories may have paid more attention to the plot of the story rather than the novel words embedded into it. Alternatively, they proposed that children with less experience of listening to stories may have been less interested or motivated to listen to the story and to understand the novel words within. Consequently, the home literacy environment may factor in to children's ability to implicitly learn vocabulary through stories. Children with more experience of listening to stories in the home may have more motivation to pay attention during shared reading and may pay closer attention to words within the narrative.

5.9 Conclusion

Stories are used all over the world as a pedagogical tool to develop children's language. It is therefore important to understand how individual differences may affect a child's ability to acquire vocabulary occurring in the stories they hear.

The current study found that children with EAL were disadvantaged at recalling novel words compared to monolinguals, when the learning task was incidental. Since most vocabulary from school onset onwards is learned through incidental exposure, this study has far reaching implications that EAL children struggle to enhance their vocabulary through this method of learning. It is therefore important to remember that such reported bilingual advantages of word learning (e.g. Kaushanskaya, 2012; Kaushanskaya et al., 2014; Kaushanskaya & Marian, 2009a, 2009b; Kaushanskaya & Rechtzigel, 2012; Nair et al., 2016) may only occur under direct instruction. Results of this study showed that children with the smallest vocabularies found it most the difficult to acquire novel words. It is therefore important that we do not rely upon implicit learning for children with English as an additional language. They may require vocabulary support through explicit instruction.

5.10 Future directions

It is important to remember that individual differences do occur across both explicit and implicit tasks of word learning. We are interested to know whether these differences are related to vocabulary growth over time. This may help to identify children who are struggling to learn vocabulary due to an underlying language disorder. The following chapter will address this by determining if experimental word learning can predict vocabulary growth over one year.

Chapter 6: Do experimental measures of word learning predict English vocabulary growth over one year? A longitudinal follow up of study 1.

6.1 Introduction

Research has found that EAL children consistently have a smaller English vocabulary than their monolingual peers across school years (Bialystok et al., 2009; Mahon & Crutchley, 2006; Oller & Eilers, 2002; Portocarrero et al., 2007). However, evidence suggests that children with EAL have a similar vocabulary trajectory to monolingual children (Hutchinson et al., 2003) or are able to acquire vocabulary more easily (Farnia & Geva, 2011). Yet, despite rapid vocabulary acquisition, EAL children, as a group, fail to close the vocabulary gap and reach the same vocabulary level as their monolingual peers by the end of schooling (Hutchinson et al., 2003; Farnia & Geva, 2011).

Mahon and Crutchley (2006), evaluated the performance of 69 monolingual and 96 EAL pupils on the second edition of the BPVS (Dunn, Dunn, Whetton, & Burley, 1997). In a cross-sectional design, children ranged between four years (the onset of formal schooling) to nine years. Although the authors found that the gap between EAL and monolingual children's English vocabulary was largest for younger children, and it narrowed with age, significant differences were still evident for the older children. Longitudinal evidence has confirmed this finding. Farnia and Geva (2011) modelled receptive vocabulary trajectories in 91 EAL children (for whom the first language was Punjabi, Tamil or Portuguese) compared to 50 ML children across five primary school years (from Year 2 to Year 7). Results of the study showed that although EAL children's vocabulary grew faster than ML children, after six years this was not enough to close the vocabulary gap, with a significant difference remaining between EAL and

ML English vocabulary scores. The researchers found that for both EAL and ML children, phonological short-term memory predicted receptive vocabulary growth. In addition to the crucial role played by phonological short-term memory, studies have shown the home literacy environment can predict vocabulary growth (e.g. Uchikoshi, 2006; Sénéchal & LeFevre, 2014). Often in the UK, it is difficult to measure the home literacy environments of children with EAL, as EAL families can be hard to reach, as well as speaking a wide range of first languages.

There is evidence of a relationship between L1 and L2 vocabulary size in bilingual children (Aarts & Verhoeven, 1999), therefore measurement of L1 vocabulary skills would be advantageous in developmental studies. However, in the UK it is generally not feasible to assess L1 vocabulary due to the multitude of home languages spoken. Furthermore, children with EAL who have underlying language disorders may be more difficult to identify (see Cattani et al., 2014) than their monolingual peers, because their poorer English language skills may be the result of a communication need (i.e. lack of input), (Battle, 2002; Crago & Westernoff, 1997; Payne & Taylor, 2007). As a result, EAL children may be over-diagnosed as having a speech and language impairment, because English-only assessment materials may identify children as language impaired, despite advanced L1 language skills but weaker English skills, simply due to a lack of exposure.

Few studies have investigated predictors of vocabulary acquisition for children exposed to two or more languages and yet understanding these predictors would enable the identification of EAL children with an underlying language disorder.

We sought to investigate whether an experimental measure of novel word learning could predict vocabulary growth for monolingual English-speaking children, and children with English as an additional language.

Our research questions were thus:

1. Does vocabulary growth over time differ between ML and EAL children?
2. Does experimental word learning predict vocabulary growth? What is the effect of language status (ML; EAL) on this growth?

6.2 Method

In order to assess whether experimental word learning predicted English vocabulary growth over 12 months, children who participated in study 1 (see Chapter 4), were followed up approximately one year after their first assessment. We employed a mixed design with two groups (ML; EAL) over two time points (T1 Year 3; T2 Year 4). Children from four schools were visited on one occasion between April and July 2018. Children were tested on their English receptive and expressive vocabulary using the BPVS-III (Dunn & Dunn, 2009) and the CELF-IV (Semel et al., 2003). As with study 1, standardised scores were not calculated for EAL children, instead children's raw scores across both measures were used for data analysis.

6.3 Participants

Participants for study 3 comprised of the same sample as study 1 (see Chapter 4). Due to absences and pupil mobility, a subset of seven children (EAL n = 4; ML n = 3) were not able to be seen for the present study, resulting in a final sample of 103 children (EAL n = 63; ML n = 40). At the time of testing, the children had an average age of nine years one month (range 8;7-9;10) and were near completion of Year 4.

6.3.1 Demographic information about EAL participants

All EAL children, where possible, were revisited. Four children lost due to attrition were speakers of Punjabi, Spanish, Romanian and Polish. This resulted in a final EAL sample with knowledge of 15 languages, the most common being Bengali and Urdu (see Chapter 4).

6.4 Results

6.4.1 Vocabulary growth

Two mixed 2x2 ANOVAs were carried out to assess receptive and expressive vocabulary growth between groups with Session (T1, T2) as a within-subjects factor and Group (ML, EAL) as a between-subject factor.

Receptive vocabulary growth

There was a significant main effect of group ($F(1, 101) = 25.96$ $p < .01$; $\eta^2 = .20$) and a significant main effect of time (F (1, 101) = 95.30; $p < .01$; $\eta^2 = .49$) showing that receptive vocabulary grew in both groups, but was larger in the ML group at both time points. The interaction between group and time was not significant ($F(1, 101) = 1.25$, p -.266) suggesting EAL and ML children had a similar rate of receptive vocabulary growth over one year.

Expressive vocabulary growth

There was a significant main effect of group ($F(1, 101) = 20.48$; $p < .01$; $\eta^2 = .17$) and a significant main effect of time (F (1, 101) = 43.78; $p < .01$; $\eta^2 = .30$) showing that expressive vocabulary grew in both groups, but was larger in the ML group at both time points. The interaction between group and time was significant (F (1, 101) = 5.37, p <.01, η^2=.10), suggesting that the expressive vocabulary of EAL children grew more than ML children over one year, thus closing the vocabulary gap. This interaction effect can be seen in Figure 11. A post-hoc independent samples t-test, however, revealed there was still a significant difference in T1 and T2 expressive scores between groups. (T1 t (108) = 5.8, p <..01; T2 t (101) =3.28, p <.01).

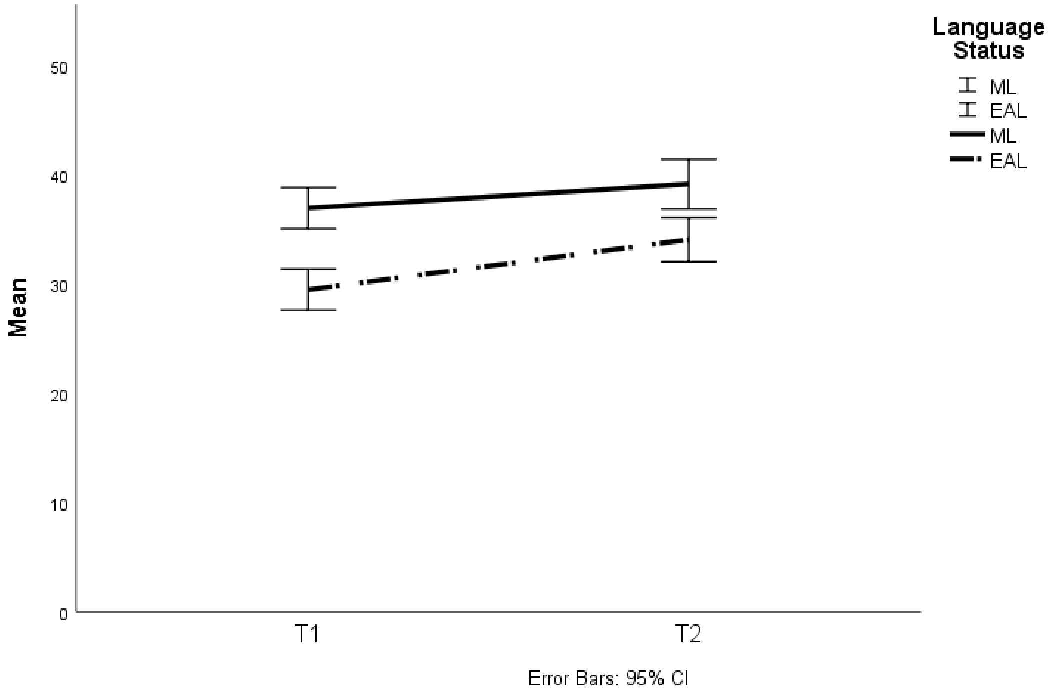

Figure 11 *Expressive vocabulary growth over one year by group*

6.4.2 **Correlates of T2 vocabulary.**

Intercorrelations among measures including the standardised measures of expressive and receptive vocabulary carried at T1 and T2, and experimental measures of word learning were computed with Person's r correlations for the whole sample (ML and EAL).

Table 19 *Pearson's r correlation for whole sample*

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1. Vocabulary Training											
2. Definition Knowledge	0.48**										
3. Immediate Recall	0.77**	0.46**									
4. Delayed Recall	0.50**	0.24*	0.45**								
5. Immediate Recognition	0.33**	0.33**	0.43**	0.28**							
6. Delayed Recognition	0.41**	0.34**	0.47**	0.44**	0.54**						
7. T1 BPVS-III	0.22*	0.29**	0.07	0.19*	0.00	0.10					
8. T2 BPVS-III	0.38**	0.36**	0.20*	0.30**	0.02	0.14	0.83**				
9. T1 CELF-IV	0.21*	0.34**	0.07	0.28**	0.08	0.09	0.73**	0.76**			
10. T2 CELF-IV	0.41**	0.40**	0.20*	0.36**	0.07	0.18	0.66**	0.73**	0.79**		
11. WASI-II	0.26**	0.16	0.22*	0.23*	0.32**	0.32**	0.30**	0.34**	0.33**	0.31**	
12. CNRep	0.27**	0.19*	0.27**	0.28**	-0.01	0.19*	0.25*	0.29**	0.29**	0.27**	0.09

Overall, receptive vocabulary at T2 correlated moderately and positively with vocabulary training scores (r=0.38; p<.01) definition knowledge (r =0.36, p <.01), immediate recall (r =.20, p= .046) and delayed recall (r =.30, p<.01). Expressive vocabulary at T2 correlated moderately and positively with vocabulary training scores (r=.41, p<.01), definition knowledge (r=.40, p<.01), immediate recall (r=.20, p=.045) and delayed recall (r=.36, p<.01).

Measures of recognition (both immediate and delayed) did not correlate significantly with either receptive or expressive vocabulary scores at T2. This was expected as recognition scores were approaching ceiling for both groups (see Chapter 4).

The standardised measure of non-verbal ability correlated moderately and positively with T2 receptive (r= .34, p <.01) and expressive vocabulary scores (r=.31, p <.01). The measure of phonological memory also correlated moderately and positively with T2 vocabulary (receptive r=.29, p <.01; expressive r=.27, p <.01).

Pearson's r correlations were then carried out separately for each group (ML/EAL).

Table 20 *Pearson's r correlations for ML children*

	1	2	3	4	5	6	7	8	9	10	11
1. Vocabulary Training											
2. Definition Knowledge	0.56**										
3. Immediate Recall	0.81**	0.55**									
4. Delayed Recall	0.54**	0.17	0.44**								
5. Immediate Recognition	0.35*	0.37*	0.46**	0.36*							
6. Delayed Recognition	0.44**	0.34*	0.52**	0.50**	0.53**						
7. T1 BPVS-III	0.26	0.22	0.16	0.10	0.04	0.11					
8. T2 BPVS-III	0.25	0.22	0.07	0.13	0.02	0.06	0.81**				
9. T1 CELF-IV	0.29	0.29	0.16	0.24	0.10	0.06	0.58**	0.72**			
10. T2 CELF-IV	0.34*	0.32*	0.16	0.22	0.05	0.15	0.56**	0.74**	0.78**		
11. WASI-II	0.26	0.16	0.32*	0.22	0.46**	0.35*	0.21	0.13	0.28	0.32*	
12. CNRep	0.29	0.19	0.19	0.20	0.00	0.36**	0.09	0.04	-0.07	0.00	-0.10

p<.01** *p*<.05*

Table 21 *Pearson's r correlations for EAL children*

	1	2	3	4	5	6	7	8	9	10	11
1. Vocabulary Training											
2. Definition Knowledge	.45**										
3. Immediate Recall	.74**	.48**									
4. Delayed Recall	.47**	.31*	.47**								
5. Immediate Recognition	.30*	.33**	.38**	.22							
6. Delayed Recognition	.36**	.40**	.39**	.41**	.54**						
7. T1 BPVS-III	.35**	.30*	.26*	.31*	.12	.30*					
8. T2 BPVS-III	.56**	.42**	.46**	.42**	.20	.36**	.80**				
9. T1 CELF-IV	.30*	.34**	.24*	.38**	.24	.29*	.69**	.72**			
10. T2 CELF-IV	.53**	.43**	.36**	.46**	.23	.34**	.65**	.67**	.76**		
11. WASI-II	.27*	.21	.18	.23	.22	.31*	.42**	.48**	.41**	.31*	
12. CNRep	.29*	.30*	.40**	.34*	.03	.12	.28*	.39**	.41**	.38**	.20

p<.01** *p*<.05*

When separated by group, the standardised measure of phonological memory no longer correlated significantly with T2 receptive (r =.04, p =.822) and expressive vocabulary (r=.00, p =.987) for ML children, however the correlations remained significant for EAL children (receptive r = 39, p <.01; expressive r =.38, p <.01). A similar pattern emerged for non-verbal reasoning, ML non-verbal scores did not correlate significantly with T2 receptive vocabulary (r=.13, p =.443), but the correlation for expressive vocabulary was marginally significant (r=.32, p =.048). With EAL children, results were similar to the whole group correlation, a significant correlation occurred between non-verbal reasoning and T2 receptive vocabulary (r=.48, p<.01) and expressive vocabulary (r=.31, p =.013).

For EAL children, T2 expressive and receptive vocabulary scores correlated moderately and significantly with experimental measures of vocabulary training (expressive r=.53, p<.01; receptive r=.56. p<.01.), definition knowledge (expressive r= 43 p<.01; receptive r= .42 p<.01), immediate recall (expressive r =.36, p <.01; receptive r=.46 p<.01), delayed recall (expressive r =.46, p <.01; receptive r=.42 p<.01) and delayed recognition (expressive r =.34, p <.01; receptive r = .36, p <.01). This was expected and was a similar finding to the whole group correlation.

For ML children, T2 expressive vocabulary scores only correlated significantly with the experimental measure of vocabulary training (r =.34, p =.033) and definition knowledge (r =.32, p =.045). T2 receptive vocabulary scores did not correlate with any experimental measures, which was unexpected in relation to the whole group correlation. As both immediate and delayed recognition scores did not correlate with T2 expressive or receptive vocabulary scores for the ML group, we tested for potential outliers using both the Malhalanobis distance and Cook's distance. These tests can ascertain whether certain cases in a dataset may wield influence on a model during a multiple regression. Any case in a dataset with a Cook's *d* score of greater than 1 (Cook & Weisberg, 1982), or a Malhalanobis distance of more than 15 (Field, 2013) may be cause for concern in a multiple regression. No ML cases in this dataset had a Malhalanobis distance of >7 or a Cooks *d* >.86, therefore no cases were removed prior to carrying out the regression analyses.

Correlations for the ML group reflect scores of 40 participants, due to this small sample size, insignificant correlations may be a result of a lack of statistical power. Consequently, independent variables for hierarchal linear regressions were determined from significant correlations of the whole sample (Table 19).

Hierarchical regression analyses were conducted to examine whether experimental measures of word learning contributed to the prediction of vocabulary growth. Experimental measures were included as independent variables, however, since recognition (both delayed and immediate) did not significantly correlate with either T2 vocabulary measure, it was excluded from the regression analysis.

Thus, five experimental predictors and an autoregressor were included as the independent variables.

6.4.3 **Predictors of receptive vocabulary growth for EAL children**

In model 1 (Table 22), raw receptive vocabulary scores (measured through the BPVS - III) were entered into the first step of the regression to act as an autoregressor. Independent variables of vocabulary training, immediate and delayed recall and definition knowledge were entered into the second step of the regression. Since receptive vocabulary scores at T2 correlated positively and significantly with the independent variables in a Pearson's *r* correlation (see Table 19), we would expect these variables to account for a significant proportion of the variance in vocabulary growth.

Table 22 *Predictors of receptive vocabulary growth for EAL children*

Model	Step	T1 Measures	R^2	R^2 Change	F change	B	Standard error B	Beta
1	1	T1 Receptive Vocabulary	.63	.63	104.83**	.83	.10	.66**
	2	Vocabulary training	.71	.08	3.90**	.15	.12	.14
		Definition knowledge;				.42	.35	.10
		Immediate Recall				.97	1.28	.09
		Delayed Recall				.68	.85	.07

Whilst the overall model was significant ($p<.01$), the individual coefficients of experimental measures were not significant.

Exploratory analysis revealed potential collinearity between the measures of immediate recall and vocabulary training, identified through variance inflation factors (VIF). This is likely since these measures correlated highly with each other ($r=.72$, $p<.01$). Although there is no formal cut-off for VIF scores, scores of 2.5 or higher may be cause for concern when carrying out regression analyses. The VIF score for vocabulary training was 2.53 and immediate recall was 2.48. Thus, these scores were entered as a composite variable calculated with an average of the normalised z-scores. This also occurred in the original study (Gellert & Elbro, 2013). All subsequent analysis was then carried out with this phonological composite variable. The variable was called the phonological aspects of word learning composite. Like the original study, vocabulary training was used as the main measure of phonological learning (Gellert & Elbro, 2013; Nation et al., 2007) and immediate recall measured the immediate storage and retrieval of phonological forms (Gellert & Elbro, 2013).

The phonological aspects of word learning composite, definition knowledge, and delayed recall were entered into model 2, with receptive vocabulary at T2 as the dependent variable. All independent variables had a VIF score of < 1.8.

Table 23 *Predictors of receptive vocabulary growth for EAL children including a phonological composite*

Model	Step	T1 Measures	R^2	R^2 Change	F change	B	Standard error B	Beta
2	1	T1 Receptive Vocabulary	.63	.63	104.83**	.83	.10	.66**
	2	Phonological aspects;	.71	.08	5.26**	3.75	1.69	.21**
		Definition knowledge;				.41	.34	.10
		Delayed recall;				.66	.84	.10

p<.01** *p*<.05*

The second step of the model predicted a significant additional 8% of the variance in T2 vocabulary (p <.01). However, only the phonological aspect composite score had a significant coefficient (p<.01). The remaining experimental measures (definition knowledge, delayed recall) did not add any significant variance to the model and were thus eliminated from subsequent analyses. A new model was created to confirm that the phonological composite remained a significant predictor once definition knowledge and delayed recall were removed (Table 24).

Table 24 *Prediction of the phonological composite on receptive vocabulary growth for EAL children*

Model	Step	T1 Measures	R^2	R^2 Change	F change	B	Standard error B	Beta
3	1	T1 Receptive Vocabulary	0.63	0.63	104.83**	0.86	0.10	0.69**
	2	Phonological Composite	0.70	0.07	13.64**	5.12	1.39	0.28**

Once definition knowledge and delayed recognition were removed, the phonological composite remained a significant predictor of T2 receptive vocabulary knowledge, predicting 7% of the variance (p <.01). We then entered the baseline measure of phonological memory (measured through the CNRep) above the composite measure of phonology, to see if phonological learning led to word learning gains after phonological memory was taken into account (Table 25).

Table 25 *Predictors of receptive vocabulary growth for EAL children controlling for phonological memory*

Model	Step	T1 Measures	R^2	R^2 Change	F change	B	Standard error B	Beta
4	1	T1 Receptive Vocabulary	0.63	0.63	104.83**	0.84	0.09	0.67**
	2	Phonological Memory	0.67	0.04	7.78**	0.55	0.31	0.14
	3	Phonological Aspects	0.72	0.04	8.64**	4.25	1.45	0.24**

p<.01** p<.05*

The phonological composite remained a significant predictor of T2 receptive vocabulary growth, accounting for 4% of the variance, when entered after phonological memory scores. The standardised measure of phonological memory (CNRep), account for a significant proportion of the variance.

As non-verbal reasoning scores correlated moderately and significantly with T2 receptive vocabulary (r =.34, p <.01), we entered WASI-II scores above the composite measure of phonology, to see if phonological learning led to word learning gains after non-verbal reasoning was taken into account (Table 26).

Table 26 *Predictors of receptive vocabulary growth for EAL children controlling for non-verbal reasoning*

Model	Step	T1 Measures	R^2	R^2 Change	F change	B	Standard error B	Beta
5	1	T1 Receptive Vocabulary	0.63	0.63	104.83**	0.79	0.10	0.64**
	2	Non-verbal reasoning	0.66	0.03	4.54**	0.52	0.28	0.14
	3	Phonological Aspects	0.72	0.06	12.34**	4.81	1.37	0.27**

The phonological composite remained a significant predictor of T2 receptive vocabulary growth, accounting for a significant 6% of the variance, when entered after non-verbal reasoning scores.

6.4.4 Predictors of expressive vocabulary growth for EAL children

Model 2 was then replicated with the expressive vocabulary raw score (T2) as the dependent variable (model 6; Table 27). Expressive vocabulary raw scores at T1 were entered as the first step in the regression analysis as an auto-regresser. The second step consisted of the phonological aspects composite, definition knowledge and delayed recall scores.

Table 27 *Predictors of expressive vocabulary growth for EAL children*

Model	Step	T1 Measures	R^2	R^2 Change	F Change	B	Standard error B	Beta
6	1	T1 Expressive Vocabulary	.58	.58	82.82**	.67	.10	.68**
	2	Phonological aspects;	.64	.06	3.25*	1.45	.87	.17
		Definition knowledge;				.16	.18	.08
		Delayed recall;				.43	.46	.09

p<.01** *p*<.05*

Model 6 did not produce any significant predictors of vocabulary growth once T1 expressive vocabulary had been controlled for. However, as the model was significant (*p* =.028) and phonological aspects of word learning had been a significant predictor of receptive vocabulary growth, we created a new model (Table 28) with only the phonological aspects variable entered after the autoregresser. In this model, the phonological aspects composite was a significant predictor of expressive vocabulary growth, accounting for a significant 5% of the variance (p <.01).

Table 28 *Prediction of the phonological aspects composite on expressive vocabulary growth for EAL children.*

Model	**Step**	**T1 Measures**	**R^2**	**R^2 Change**	**F Change**	**B**	**Standard error B**	**Beta**
7	1	T1 Expressive Vocabulary	0.58	0.58	82.79	0.72	0.09	0.68**
	2	Phonological Aspects	0.63	0.05	8.28	2.06	0.72	0.24**

p<.01** *p*<.05*

As a result, we entered the baseline measure of phonological memory (measured through the CNRep, (Gathercole & Baddeley, 1996) above the composite measure, to see if phonological learning led to expressive vocabulary gains after phonological memory was taken into account (Table 29).

Table 29 *Prediction of the phonological aspects composite on expressive vocabulary growth for EAL children, controlling for phonological memory*

Model	**Step**	**T1 Measures**	**R^2**	**R^2 Change**	**F change**	**B**	**Standard error B**	**Beta**
8	1	T1 Expressive Vocabulary	0.58	0.58	82.79**	0.71	0.09	0.66**
	2	Phonological Memory	0.59	0.01	1.58	0.08	0.17	0.04
	3	Phonological Aspects	0.63	0.04	6.66*	1.95	0.76	0.23*

p<.01** *p*<.05*

As with receptive vocabulary growth, the phonological composite remained a significant predictor (p =.012) of T2 expressive vocabulary growth, accounting for 4% of the variance, when entered after phonological memory scores. As with receptive vocabulary, the standardised measure of phonological memory (CNRep), did not account for a significant proportion of the variance.

As non-verbal reasoning scores correlated moderately and significantly with T2 expressive vocabulary (r =.31, p <.01), we entered WASI-II scores above the composite measure of phonology, to see if phonological learning led to word learning gains after non-verbal reasoning was taken into account (Table 30).

Table 30 *Prediction of the phonological aspects composite on expressive vocabulary growth for EAL children, controlling for non-verbal reasoning*

Model	**Step**	**T1 Measures**	**R^2**	**R^2 Change**	**F change**	**B**	**Standard error B**	**Beta**
9	1	T1 Expressive Vocabulary	0.58	0.58	82.79**	0.73	0.10	0.68**
	2	Non-verbal reasoning	0.58	0.00	0.03	-0.03	0.15	-0.22
	3	Phonological Aspects	0.63	0.05	8.16**	2.08	0.73	0.25**

The phonological composite remained a significant predictor of T2 expressive vocabulary growth, accounting for a significant 5% of the variance, when entered after non-verbal reasoning scores. Non-verbal reasoning scores did not account for a significant proportion of the variance.

6.4.5 Predictors of receptive vocabulary growth for ML children

Raw receptive vocabulary scores at T2 were entered as the dependent variable in model 10 (Table 31). Receptive vocabulary (measured through T1 BPVS-III raw scores) at T1 was entered into the first step of the regression, to control for baseline receptive vocabulary scores.

To directly compare EAL children and ML children, the same independent variables as model 2 (Table 23) were entered into the monolingual regression (phonological aspects composite, definitions knowledge and delayed recall).

Table 31 *Predictors of receptive vocabulary growth for monolingual children*

Model	**Step**	**T1 Measures**	**R^2**	**R^2 Change**	**F Change**	**B**	**Standard error B**	**Beta**
10	1	T1 Receptive Vocabulary	.66	.66	72.62**	.87	.10	.81**
	2	Phonological Aspects	.67	.02	.59	-2.12	2.12	-.14
		Definition Knowledge				.35	.38	.11
		Delayed Recall				1.03	.93	.13

p<.01** *p*<.05*

In model 10, (Table 31), receptive vocabulary at T1 accounted for a significant 66% of the variance of receptive vocabulary scores at T2. The Beta score was 0.81, (*p*<.01), suggesting more stability of the autoregressor in this model compared to the corresponding model for EAL children (model 2), consequently there was less change for the experimental measures to predict.

The experimental measures of phonological aspects, definition knowledge and delayed recall did not account for any additional variance and were thus removed (*p*=.627). As the overall model was not significant, the phonological aspects composite was not entered into a separate model, as it was for the EAL group.

Once monolingual children's T1 receptive vocabulary scores were controlled for, no other experimental measures predicted vocabulary growth.

6.4.6 **Predictors of expressive vocabulary growth for ML children**

Table 32 *Predictors of expressive vocabulary growth for monolingual children*

Model	Step	T1 Measures	R^2	R^2 Change	F Change	B	Standard error B	Beta
11	1	T1 Expressive Vocabulary	.61	.61	59.01**	.91	.14	.75**
	2	Phonological Aspect	.62	.01	.30	.26	1.10	.04
		Definition Knowledge				.12	.20	.08
		Delayed recall				-.01	.48	.00

p<.01** *p*<.05*

Expressive vocabulary at T1 accounted for a significant 61% of the variance of expressive vocabulary scores at T2. The experimental measures of phonological aspects, definition knowledge and delayed recall did not account for any additional variance and were thus removed (*p*=.822). As the overall model was not significant, the phonological composite was not entered into a separate model.

6.5 Discussion

The aim of this study was to investigate the relationship between experimental measures of word learning and receptive and expressive vocabulary growth over one year. We were interested to see whether growth in vocabulary differed between groups

(ML/EAL) and whether this growth was predicted by experimental measures of word learning.

At both time points (T1/T2), ML children had a larger receptive and expressive vocabulary than EAL children. ML and EAL children had similar growth in receptive vocabulary over one year, however growth in expressive vocabulary was greater for EAL children.

The phonological aspects of word learning, as measured through vocabulary training and immediate nonword recall, were found to account for a significant proportion of both expressive and receptive English vocabulary growth for EAL children. The predictive relationship between novel word learning and English receptive and expressive vocabulary growth was found after controlling for phonological memory, which was not found to be a significant predictor of vocabulary growth for EAL children. However, definition knowledge of nonwords and the delayed post-test of novel word recall did not predict either receptive or expressive English vocabulary growth.

In contrast, monolingual children's vocabulary knowledge over 12 months was only predicted by vocabulary knowledge at Time 1. When T1 vocabulary was controlled for, no other experimental measures predicted vocabulary growth. This could be because the task was more akin to second language learning than first language learning, as it involved learning another label for a familiar object. It therefore could have been more sensitive to second language growth than native language growth. EAL children will have experience of multiple labels for one referent, and are thus more inclined to assume that novel words can be mapped to known objects (Byers-Heinlein & Werker, 2009; Davidson et al., 1997). This would explain why the EAL children's ability to learn the novel word predicted their ability to map new English vocabulary labels onto known concepts in their L1. The task therefore seems to be predicting L2 growth, which is why only vocabulary growth for EAL children was predicted. For ML children, however, growth in the L1 was not predicted by their ability to learn novel labels for familiar concepts.

The phonological advantage reported in studies of bilinguals (e.g. Bartolotti & Marian, 2012; Bartolotti et al., 2011; Kaushanskaya, 2012; Kaushanskaya & Marian, 2009a, 2009b; Van Hell & Mahn, 1997; Wang & Saffran, 2014), and found in study 1 (see chapter 4) remains important for EAL children in the current study. Measures of EAL children's ability to remember the phonological aspects of novel words predicted English vocabulary growth, whereas their ability to remember the semantic aspects of novel words did not. This would suggest that EAL children seem make use of their phonological advantage when learning new words.

6.6 Conclusions

The current study has provided evidence that a dynamic learning task to measure word learning ability can predict vocabulary gains in English for children with English as an additional language. The task did not predict vocabulary growth for children for whom English is their first language. The task was able to predict growth in second language vocabulary for EAL children, but not first language vocabulary for monolingual children. The measure used familiar concepts (animals), for which children were taught a new label. This may explain the different findings in the two groups as learning in this task most likely predicts English vocabulary in EALs as it is more akin to second language learning (mapping new labels to familiar concepts), than L1 learning.

The EAL children's phonological word learning skill accounted for T2 vocabulary growth even after accounting for children's phonological memory, as measured by nonword repetition. The measure of nonword repetition was not significant, suggesting that experimental nonword learning could be a more sensitive predictor of EAL children's vocabulary learning ability than standardised, static measures.

6.7 Implications of findings

The current study identified that EAL children's ability to learn the phonological aspects of non-words significantly predicted their vocabulary growth over one year. We know that EAL children have an overall deficit in their English vocabularies (e.g. Hutchinson et al., 2003; Murphy, 2014), however, what we cannot tell is which children from the subgroup are proficient word learners simply in need of more exposure, and which children have an underlying learning disorder. If tests of word learning ability could be given to children with English as an additional language, we may be able to screen for children who are weaker word learners. However, future research is needed to assess the long-term impact of a word learning screening tool such as that used in the current study, with a larger sample.

Our study has suggested that EAL's vocabulary growth can be predicted by the phonological aspects of word learning, suggesting EAL children's vocabulary learning is supported by their phonological skills. Explicit teaching of vocabulary in this group should include explicit phonological training to boost the rate of acquisition. However, the novel word learning task did contain a working memory component. Since we did not carry out standardised assessments of working memory, we were unable to control for differences in storage and retrieval processes within the models, which is a clear limitation. Future novel word learning studies should include standardised working memory assessments to control for individual differences in children's memory capacities. Currently, little is known about the methods teachers in the UK are using to teach vocabulary to children with English as an additional language. The following chapter will address this.

Chapter 7: A practitioner's perspective of the barriers facing children with English as an additional language: A Delphi study

7.1 Introduction

Currently in England, 21.2% of children in primary classrooms speak English as an additional language (EAL) (DfE, 2019). The proportion of EAL children in England is steadily increasing year on year, (Department for Education, 2017, 2018), and teachers must adapt in order to provide suitable provisions for pupils. Historically, there has been a gap between the attainment of EAL and monolingual pupils (Demie, 2018). Investigations into the attainment gaps between monolingual and EAL pupils have seen the problem placed at pupil level (such as language proficiency, general cognitive ability, cultural differences or socio-economic status) (House of Commons, 2003, as cited in Murakami, 2008). However, more attention needs to be paid to the level of instruction that EAL pupils are receiving across the country. The Department for Education (DfE), requires that EAL education is covered across all Initial Teacher Training (ITT) programmes. Section 5 of the Teachers' Standards checklist for student teachers requires that a teacher must:

> Have a clear understanding of the needs of all pupils, including those with special educational needs; those of high ability; those with English as an additional language; those with disabilities; and be able to use and evaluate distinctive teaching approaches to engage and support them. (Department for Education, 2011, p.1)

However, EAL is seen to have a marginal status in school (Leung, 2001) and teacher surveys have revealed little provision for subject specific, EAL training both during the ITT phase (Franson, 1999) and later during a teacher's career path (Murakami, 2008). Without a rigorous, universal programme of teacher training concerning EAL pupils, it is difficult to imagine the extent to which teachers are knowledgeable about linguistic research that may benefit the children in their class. For example, research into school-based interventions has revealed that EAL pupils can benefit from explicit training of vocabulary (Oxley & DeCat, 2019). When left to acquire new words incidentally, however, vocabulary gains tend to be smaller compared to explicit training (see Coyne, McCoach & Kapp, 2007). These findings were confirmed by experimental studies of word learning (see Chapters 3 and 4).

Since most vocabulary learning is acquired incidentally by school age (Cain, Oakhill, & Elbro, 2003; Justice, 2002), it is probable that EAL children, who already start school with a smaller English vocabulary than their monolingual peers (Bialystok et al., 2009; Hutchinson et al., 2003; Mahon & Crutchley, 2006; Oller & Eilers, 2002; Portocarrero et al., 2007) will be disadvantaged unless they are encountering explicit vocabulary instruction at school. Little is currently known about the extent to which explicit vocabulary training is occurring in the classroom. This chapter seeks to address this by adopting a Delphi, three round questionnaire, targeting teachers from both primary and secondary schools across England. Only teachers were recruited for this Delphi, rather than other associated stakeholders, as our primary interest was whether current practice in classrooms in the UK reflects research findings.

7.2 The Delphi method

The Delphi method of questionnaire is characterised by anonymity between participants and multiple iterations of responses. Participants are given feedback of whole group responses in between iterations (Cochran, 1983; Cyphert & Gant, 1971; Dailey & Holmberg, 1990; Uhl, 1983).

A Delphi method was chosen for the current study as a group consensus has greater validity than an individual response (Brooks, 1979). Furthermore, the Delphi uses an online platform, consequently, experts in the field who may be separated geographically can take part (Murry & Hammons, 1995). Anonymity between participants avoids problems which may arise in a group interview. Namely, the risk of bandwagon effects is eliminated. Participants will not feel pressure to follow authority, and individuals with less confidence in public speaking will be equally able to put across their point of view (Martorella, 1991). In group interviews, there may be a bias towards those with a higher status, for example head teachers or school senior leaders. Those with the lower status, such as newly qualified teachers, may comply with the opinions of those with a higher status, whether or not they believe in the same ideologies. This would therefore give an unrepresentative outcome and not be reflective of what is happening in English classrooms.

Generally speaking, if consensus is reached within a Delphi, the outcome reflects reasoned opinions as experts are given time to reflect upon the question at hand and can give written responses (Murray & Hammons, 1995). Brooks (1979) defines consensus as answers grouped around a median response, with stability reached when little or no further shifting of positions occurs.

The minimum number for a Delphi panel generally is considered to be 10 expert participants, (Cochran, 1983), however larger group size may lead to a reduction in error and improved reliability. Delbecq, Van de Ven, and Gustafson, (1975) argued that in a homogenous group of well-chosen experts, few new ideas are generated in excess of 30 participants. For this reason, we aimed to recruit 30 participants for this study.

The current study was created to elicit whether the size of an EAL pupil's vocabulary emerged as a concern from teachers, and what was being implemented in class to aid vocabulary acquisition.

We therefore sought to answer the following research questions:

1. Are teachers concerned about vocabulary learning in the classroom for EAL children?
2. What are teachers doing, if anything, to improve the vocabularies of children in the classroom?

7.3 Methods

Using the Delphi protocol, qualitative date was collected in three stages.
Opinion differs as to the point at which consensus can be agreed upon in a Delphi study. Where a seven-point scale is used, Ulschak (1983) recommends consensus is reached when 80% of participant responses fall within two of the scale categories. Whereas Green, (1982) indicates that a four point scale should be used, and 70% of participants should rate three or higher, with the median lying at 3.25 or higher. Generally, central tendency measures such as mean, median and mode are used to analyse consensus on a Likert-type scale during Delphi questionnaires and the median score is preferred (Eckman, 1983; Hill & Fowles, 1975; Jacobs, 1996). However, the median could be misleading if there is clustering of results around two or more points (Ludwig, 1994). Additionally, standard deviations and interquartile ranges should be used to demonstrate the level of dispersion of responses (Hasson, Keeney, & McKenna, 2000). For the purpose of this Delphi study, both central tendency measures and dispersion measures were analysed and reported.

7.3.1 Recruitment

Thirty-one teachers were recruited from both primary and secondary schools across England. Recruitment took place online via social media, and in person though teacher training events. The survey was also advertised in the monthly newsletter of a teaching charity. Those recruited were required to be either currently teaching, or had previously taught, children with EAL. Teachers were additionally asked to record the number of years they had been teaching and the type of institution in which they taught. Participants who gave consent to take part in the Delphi gave a personal email address and were contacted on three separate occasions over the course of the academic year using an online questionnaire (Online Surveys, 2018). Attrition is common in Delphi questionnaires, and this proved to be the case in the current study. Attrition was approximately 30% at each stage of the Delphi, with 13 participants remaining at round 3.

Table 33 *Geographical location of respondents at round 1*

Geographical Location	Number of respondents
London	2
North West	4
East Anglia	2
South East	5
North East	10
Yorkshire and the Humber	7

7.3.2 Delphi iterations

Round 1

Teachers of children with EAL in the UK were asked three open questions to identify what they perceive as the greatest barriers to learning for this population.

1. In schools throughout the UK, what are the three greatest barriers to academic achievement for primary and secondary aged pupils with English as an additional language?
2. What instructional strategies do you routinely offer to break down the barriers mentioned in question 1?
3i.What additional support would you like to offer if you had the resources?
3ii. Are there any barriers to this?

At this stage, 31 participants completed the questionnaire by the given deadline. The results of questionnaire one were then collated into a list of themes.

Round 2

After the data had been and analysed, the results of the first round was synthesised into a list of the most common barriers to learning identified by the panel (see Tables 34, 35, 36 & 37). The teachers were asked to rank order these barriers to learning from greatest to smallest, as well as stating if they believe their opinions had been included. If they did not believe their opinions were included, they were prompted to resubmit an answer. There was a two week window between iterations (Delbecq et al., 1975). After one week, participants were sent a further email reminder about the study, with a link to the questionnaire and a reminder of the deadline.
At this stage, the lowest ranking answers were eliminated. As only five answers were given for question three part two, we opted to keep all possible answers.

Round 3

The final stage of the Delphi study provided the panel of teaching professionals with the median results of the previous round, and a reminder of their own rankings. This gave the panel the chance to change their opinion. Panel members once again ranked the answers from greatest to smallest.

7.4 Round One

7.4.1 Sample and location

Thirty-one participants took part in round one. Participants had a mean of nine years teaching experience (range 0.5 years -32 years) and represented a wide sample of locations across England. A quarter of respondents represented primary school teachers (n = 7) and one respondent was a middle school teacher (9-13 years). Over half of representatives taught in secondary schools for pupils aged 11-16 years (n = 17), two teachers taught in secondary schools which included a sixth form (ages 11-18), one teacher worked across primary and secondary and one was a former teacher now working for local government as EAL specialist support. All teachers reported that they either currently taught or had formerly taught children for whom English was an additional language.

7.4.2 Analysis of findings

After the open questions of round 1, participant responses were summarised into main subtopics. Tables 34, 35, 36 and 37 give examples of answers cited, along with the synthesised subtopic. The subtopics were the sent to practitioners for round 2, in which they were ranked accordingly.

Question 1 In schools throughout the UK, what are the three greatest barriers to academic achievement for primary and secondary aged pupils with EAL**?**

Table 34 *Synthesised answers to question 1*

Synthesised problem	**Evidence cited in Delphi**
Lack of English vocabulary knowledge	Lack of academic language; Lack of vocabulary in all subjects; Trying to teach them complex English GCSE vocab when they don't have basic vocab; Lack of depth of vocabulary and comprehension of the learners
Poor literacy skills in English	Exams in English; Sentence structure and use of tenses; Requiring a reading age of at least 14 years old for most GCSE content; Poor reading skills; Lack of understanding of exam questions; Heavy content of GCSE exams; Not understanding the language in explanations and instructions; Not understanding success criteria of tasks
Lack of teaching resources	Lack of resources for Secondary linked to new curriculum (including bilingual resources); Lack of bilingual dictionaries or no access to it due to no funding; Lack of resources in their mother tongue
Lack of specialised support staff	One to one support; Class size; Lack of specialised staff; Lack of targeted EAL support in school
Communication difficulties with parents	Parents not speaking English well enough to provide support; Proficiency of parents' language skills in English; Home environment; Lack of parental engagement due to language barrier
Social and cultural differences	Lack of cultural understanding
Lack of EAL pedagogic knowledge	Lack of teacher understanding around bilingualism; Mainstream teachers' lack of awareness of EAL pedagogies and of English language grammar; Lack of EAL-orientated teacher training; Limited CPD access due to funding restrictions; Lack of specialist knowledge about second language acquisition; Lack of skilled EAL teachers
Lack of differentiation in lessons	Quality of teaching/scaffolding; Very little EAL differentiation given to EAL learners in classrooms outside of EAL specialist support; Differentiation is challenging as the EAL students are at so many different levels.
Poor first language skills	Previous lack of literacy in home languages.
Age of arrival in UK	Age at which they arrive in the country; length of time to achieve academic English
Attitudes of staff and senior leaders (e.g. lack of high expectations, lack of sensitivity)	Not allowing enough thinking time leading to a lack of answers and an assumption that pupil is less able. Teacher expectations (unconscious); Lack of holistic pedagogical support; lack of sensitivity to the needs of EAL students by teachers; assumption that pupil is less able

Pupil Motivation	Lack of motivation by the student
Lack of interventions	Not enough one to one support available; No interventions

Question 2 What instructional strategies do you routinely offer to break down the barriers mentioned in question 1?

Table 35 *Synthesised answers to question 2*

Instructional strategy	Evidence cited within Delphi
Use of the first language	Translating key words
	Having instructions on the board in English and the students' home language. I once had a PPT in English, Romanian, Czech, Urdu and Arabic
	Keyword sheets in home language
	Bilingual resources
	The use of L1
	Translations
	Try to learn their language to make them feel welcomed
	Greet the class in our class's home languages
	I have asked for translators to be present to be able to effectively speak with parents of EAL children to support learning.
Collaborative learning	I try to place an EAL student beside other students who I know are willing and able to help
	Using students of same mother tongue with better levels of English, seating plans
	Group them with other EAL students who can speak English
	Pairing children up with a 'buddy' to shadow.
Collaboration with specialists	Collaboration with specialist teachers
	I facilitate CPD, provide advice and support by building capacity in schools; offer specialist advice to mainstream staff
	Teacher training sessions
	Researches
	I often seek the support of the specialist EAL teacher in my school. I have moved my EAL children from the SEN table unless they have SEN as well as being EAL
	Very close communication with the EAL department in my school to improve my own practice; Training; Being involved with local HUBS
Vocabulary teaching/pre-teaching	Teach functional vocabulary as part of lessons
	Focus on words and language in each lesson, word study, word mats

	Vocabulary development; substitution tables; mix and match tasks to understand key words; pre-teaching of vocabulary
	Specialist terminology word cards
	Spelling and word definition sheets at start of new topics
Simplification of language	Simplifying language
	Chunk instructions into smaller bits
	Clear instructions to the child and clarification of tasks
	Chunking work
	Not overloading with instructions
	Broken down questions/instructions
Providing visual/audio aids	Include images to support text based and spoken instructions
	Providing visual organisers and limiting note taking
	Use graphic organisers/pictures/images/videos/gestures
	Use pictures; keywords linked to pictures
	Pictures, Diagrams, Demonstration
	Images to help understand key concepts
	Images/singing
Differentiation in lessons	I make additional or separate worksheets for the EAL student. I also ensure questioning is well differentiated
	Differentiated work within lessons
	Give students time to respond
	Work at the pace of the pupil
	Allow at least double the thinking time for EAL pupils
	Differentiated worksheets etc.
	Ensure pupils understand homework instructions before leaving class
	Try to organise support and break down tasks.
	Understanding their levels and marking
	Modelling answers
	Checking for understanding when on tasks.
Interventions	Intensive support for new arrivals; where possible interventions
	I offer a language across the curriculum approach to any learning combined with specific time limited interventions focusing on language aspects/structures not seen in lessons

	Our school has a large EAL department who work with EAL pupils in withdrawal groups and to help support other departments to differentiate work / support pupils, withdrawal from lessons
	Interventions based around grammar for these children
Communication with parents	Communication with parents; We also have strong community links to support families as well as individual pupils
	Encourage the school to invite parents in for meetings
	Coffee mornings for parents
Grammar teaching	Direct grammar teaching
	Teaching grammar as required within different curricular areas
	Interventions based around grammar for these children
	Encourage writing in full, correct English sentences
Encouragement to read in English	High quality texts
	Encourage reading of English texts.
Sign language (e.g. Makaton)	Lots of gesture to aid understanding
	Makaton sign language
Cultural awareness of EAL children	Cultural awareness of EAL students
Spoken English practice	Lots of oracy work
	Talk Boost
Pastoral/wellbeing support	Care from teachers and pastoral staff for support with bullying

Question 3 part 1 What additional support would you like to offer if you had the resources?

Table 36 *Synthesised answers for question 3 part 1*

Support	Evidence cited within Delphi
Support staff in the classroom (including language specialist staff)	LSA support in the classroom
Bilingual support staff in school administration (e.g. To translate school letters, phone parents)	I would also like to be able to send school notices home for parents in their language to further engage them with their child's learning. The obvious barrier to this is not being able to translate the notices myself and having a large range of different languages spoken at home
Collaborative learning	Collaborative learning structures with EAL students
Technology	Access to electronic devices and translators; would love iPads/laptops so EAL students can access online resources and work can be differentiated more easily
English lessons for parents	There is always huge demand from parents for ESOL classes, both to help them in their daily lives / studies / careers, but also to help support pupils with their school work. Extra free sessions would be appreciated, but funds do not allow
	EAL lessons for parents
Small group English language classes for EALs	Small group sessions for EAL pupils to teach English as a Second Language
More one to one time with pupils	1 to 1 sessions
	I would like to be able to spend more time with the individual students
Bilingual resources in wide range of languages	Better quality bilingual resources in a wider range of languages
Interventions for EAL pupils	Better interventions and resources especially for senior schools
	Extra interventions purely for EAL children
	More time for pull out and intervention

CPD/training for staff	I would like frequent and ongoing training. The school budget and timetable doesn't support this Extra training from EAL experts regarding resources or programmes to use etc.
More speaking practice in English	More intensive English language speaking
Qualified EAL teachers	A specialist EAL teacher to give some intensive early intervention to accelerate pupils acquisition; Support from language specialist
Software to produce EAL specific resources	Software to produce resources;
Resources produced by individual class teachers tailored to specific child’s needs	I would like the students to have more individual work produced by subject teachers. This rarely seems to happen apart from in a few rare cases.
Language classes for teachers/support staff	Training within the child's own language for myself
Visual timetables	Visual time tables and time to make them

Question 3 part 2 Are there any barriers to this?

Table 37 *Synthesised answers for question 3 part 2*

Barrier	Evidence cited within Delphi
Funding	Budget
	Money
Staffing	Staffing
Workload	Workload
	Curriculum pressures
Class size	Class sizes and a large syllabus
Lack of knowledge/training	Knowledge, training, understanding of programmes that work
	Many of the school staff are not properly equipped to meet the needs of EAL learners at various stages of language acquisition.

7.5 Round Two

7.5.1 Sample and location

All respondents from round one were contacted again after answers had been synthesised into subtopics. At this stage participants were asked to rank each answer. For example, in question 1, participants were asked to rank the list of potential barriers for attainment for EAL pupils from the greatest barrier (1) to the smallest barrier (14). One week after the participants were emailed to participate in round 2, those who had not responded were sent an additional prompt. One week after the prompt, the survey was closed. This resulted in 22 respondents from the initial 31. Three participants were eliminated at this stage for incomplete responses, resulting in a final sample at round two of 19. The average years of teaching experience of the 19 respondents was 10 years (range 0.5-32), representing five teachers from primary schools, eleven from secondary, one middle school teacher, one cross phase teacher and one county EAL specialist.

7.5.2 Analysis of findings

Question 1 In schools throughout the UK, what are the three greatest barriers to academic achievement for primary and secondary aged pupils with EAL?

Table 38 *Rankings of barriers to academic achievement from greatest to smallest*

	Median	Mean	Mode	SD	Interquartile Range
Lack of EAL pedagogic knowledge	4	4.59	1	3.05	5
Lack of English vocabulary knowledge	4.5	5.22	1	3.90	4.5
Poor literacy skills in English	5	6.11	1	4.11	6.5
Lack of specialised staff	4	5.28	4	3.03	5
Lack of differentiation in lessons	6.5	7.33	3	4.22	7.75
Lack of teaching resources	6	7.22	5	4.01	7
Poor first language skills	6	5.28	6	3.11	5.25
Lack of interventions	7	7.39	9	3.04	3.75
Communication difficulties with parents	8.5	8.22	8	3.14	3.75
Age of arrival in UK	8	7.89	14	3.83	4.5
Attitudes of staff and senior leaders	9.5	9	13	4.14	7
Issues at home	10.5	9.67	7	3.73	6
Social and cultural differences	11	10.61	11	2.61	3.5
Pupil motivation	12	9.18	14	4.78	8

At this point, collectively the most highly ranked barriers to academic achievement for pupils with EAL were seen to be a lack of pedagogical knowledge regarding EAL, a lack of pupils’ English vocabulary knowledge and poor literacy skills in English. A lack of specialist staff and a lack of differentiated tasks were additionally ranked highly. Indications at this stage revealed that a combination of both a lack of language skills at pupil level alongside a lack of EAL pedagogic knowledge at teacher level led to the largest barriers for academic achievement. At the other end of the spectrum, issues at home, social and cultural differences, pupil motivation and attitudes of staff and senior leaders were seen to be the least great barriers to attainment based on their mean, median and modal scores. Encouragingly, this suggests that teachers do not place blame of EAL under-achievement on pupils' own motivation to learn. The research team elected to use a cut off of a median rank of 9 or higher from the second round of the Delphi, equating to four responses. The following barriers to academic achievement were therefore eliminated in the subsequent iteration of the Delphi questionnaire:

1. Attitudes of staff and senior leaders
2. Issues at home
3. Social and cultural differences
4. Pupil motivation

Practitioners were additionally asked at this point whether there were any barriers to attainment which were not accounted for in the original rankings. Trauma before starting school and lack of parental involvement were identified by one respondent as additional barriers and were consequently included in the final round of the Delphi.

Question 2 What instructional strategies do you routinely offer to break down the barriers mentioned in question 1?

Table 39 *Rankings of instructional strategies from most routinely offered to least*

	Median	**Mean**	**Mode**	**SD**	**Interquartile Range**
Collaborative learning	3	5.18	1	4.20	7
Vocabulary teaching/pre-teaching	5	4.77	2	2.82	5
Simplification of language	5	6	2	4.38	3
Providing visual/audio aids	4	4.53	4	2.72	2
Differentiation in lessons	4	5.12	5	3.45	3
Collaboration with specialists	7	7.29	4	3.75	6
Interventions	7	7	7	2.61	3
Cultural awareness of EAL children	7	8.35	7	3.86	6
Spoken English practice	8	8.59	8	3.38	4
Reading encouragement in English	9	7.88	10	4.13	6
Use of the home language	9.5	8.56	9	4.42	7.5
Grammar teaching	10	9.88	12	2.42	4
Communication with parents	12	11.65	13	2.14	3
Pastoral/wellbeing support	12.5	10.81	15	4.50	7
Sign language	13	12.82	15	2.01	2

Collaborative learning was ranked the most commonly used support for children for whom English is an additional language, followed by vocabulary support, language simplification, visual and audio aids, and differentiation in lessons. This highlights that language is being targeted by teachers through peer support and vocabulary instruction. The simplification of language and usage of visual and audio cues shows a level of differentiation for EAL pupils, most likely for those who are new to English, in the early stages of language acquisition.

It is surprising to see that pastoral or wellbeing support is the one of the least offered supports used to break down the barriers to academic achievement for pupils that speak English as an additional language. This could be due to language barriers hindering communication, or perhaps teachers did not view well-being support as a factor relating to attainment.

The following instructional strategies with a median ranking of above 9 were removed from the subsequent iteration of the questionnaire:

1. Use of the home language
2. Grammar teaching
3. Communication with parents,
4. Sign language
5. Pastoral/wellbeing support

Question 3 Part 1 What additional support would you like to offer if you had the resources?

Table 40 *Rankings of support teachers would like to offer if they had the resources from most wanted to least*

	Median	**Mean**	**Mode**	**SD**	**Interquartile Range**
Bilingual support staff	3	4.88	1	4.23	7.25
CPD/training for staff	4.5	4.38	2	2.20	4.25
Small group English lessons for EALs	4	5.44	3	3.90	4.5
Qualified EAL teachers	5.5	6.25	1	3.98	7.5
More 1-1 with pupils	4.5	5.13	5	3.28	4.5
Bilingual resources	6.5	7.06	6	3.38	4.5
Targeted interventions	6	6.19	7	2.46	3
More speaking in English	8	8	8	3.02	4
Collaborative Learning	9	8.31	7	3.42	3.25
English lessons for parents	8	8.4	13	3.76	6
Technology	10	8.56	11	3.81	4.25
Language classes for teachers/support staff	10	9.81	13	3.11	5.5
Visual timetables	12	11	14	2.96	5.25

Bilingual support staff, continued professional development and qualified EAL teachers were ranked the support teachers would most like to offer, as well as small group English lessons and one to one support for pupils. All of these factors can be related to a child's language needs. A lack of knowledge about how children learn language and how best to support EAL pupils, means teachers feel they would benefit from more specialist staff and bilingual support staff who have a direct communication link with pupils. Furthermore, small group English classes for EAL children and more one to one support suggests that teachers feel EAL children would benefit from more structured and scaffolded English language support. This would be either as a small group outside of the classroom, or with the aid of a member of staff one to one in class, suggesting teachers feel some EAL children are currently not receiving enough English language support which is causing poor attainment.

It is unsurprising that language classes for teachers and support staff were not ranked highly. Given the amount of languages spoken in the average UK school, it would be highly impractical to provide this sort of support. Furthermore, with teachers already stretched in terms of workload, it would be difficult to fit in such language classes into an already very busy workload.

Once again, the following answers with a median score of above 9 were eliminated for the subsequent iteration:

1. Language classes for teachers and support staff
2. Visual timetables
3. Technology

Question 3 Part 2 Are there any barriers to this?

Table 41 *Rankings of the barriers to additional support teachers would like to offer*

	Median	Mean	Mode	SD	Interquartile Range
Funding	1	2.18	1	1.65	3
Class-size	2	2.76	2	1.44	2
Lack of knowledge/training	2	2.88	2	1.45	2
Workload	3	3.12	3	1.08	0
Staffing	4	3.65	4	1.08	1

Funding was found to be the greatest barrier to additional support that teachers would like to offer, followed by limitations of class-size, and a lack of knowledge and training. These findings are certainly linked. While funding was the greatest barrier, this will trickle down and impact the remaining barriers identified. For example, a lack of funding in schools generally results in fewer support staff, which will impact on teachers' workloads, lead to larger class sizes and therefore fewer opportunities to take part in continued professional development.

7.5.3 Synthesis of findings

- A lack of teacher knowledge surrounding EAL pedagogy was ranked the greatest barrier to EAL pupil achievement, closely followed by a lack of pupils' English language skills including a vocabulary deficit.
- Social and cultural differences and pupil motivation were ranked the least likely barrier to EAL attainment.
- The most commonly offered support for EAL pupils was collaborative learning, alongside vocabulary support and audio and visual aids.
- Sign language and pastoral/wellbeing support were the least commonly offered support systems.
- If teachers had the means, the support they would most like to offer is bilingual support staff, however funding was a barrier to this. The desire for bilingual support staff suggests that teachers would like to use the home language if possible, in class, which may aid the children's acquisition of English, for example through the use of L1-L2 translations or cognates.
- Visual timetables were not seen as support that teachers would like to offer.

7.6 Round Three

7.6.1 Sample and location

At round three, all teachers who participated in the previous round were emailed, inviting them to take part in the final round. At this point, participants were reminded of their rankings they provided in the previous round and were then informed of the collective rankings of all participants. Participants were then asked to re-rank the responses. As with round two, teachers who had not responded after the first week of the survey were sent a prompt email. Thirteen teachers responded to the final round of the Delphi within the two-week time frame, representing an average of 11 years teaching experience (range 0.5-30 years). Four teachers represented primary school, four represented secondary schools up to aged 16, 2 taught in secondary schools up to age 18, one teacher taught in a middle school (ages 9-13), one teacher taught across-phase teacher and one was a former teacher who now works as a county advisor for EAL.

7.6.2 Analysis of findings

Question 1 In schools throughout the UK, what are the three greatest barriers to academic achievement for primary and secondary aged pupils with English as an additional language?

In the previous round, participants had ranked a lack of language skills at pupil level and a lack of pedagogical knowledge at teacher level as the greatest barriers to academic achievement for pupils for whom English was an additional language. At this point, taking into consideration the median and modal responses, the results remained relatively stable from round 2, with lack of EAL pedagogy and specialised staff ranked the greatest barriers to pupil academic achievement, and a lack of vocabulary and literacy falling slightly behind. Additional barriers of a lack of targeted language interventions and a lack of differentiation fell slightly behind the language related barriers, however without sufficient differentiation in class or withdrawal for language related interventions, EAL pupils may struggle to acquire language and literacy skills. Such skills could be targeted if teachers had specialised staff or were confident in EAL pedagogy, the barriers ranked the greatest in this Delphi.

Table 42 *Rankings of barriers to academic achievement*

	Median	Mean	Mode	SD	Interquartile range
Lack of EAL pedagogy	2	3.15	1	2.85	3
Lack of specialised staff	2	3.07	2	2.30	3
Poor literacy skills	5	6.31	4	2.37	4
Lack of pupil's English vocabulary	5	6.31	5	3.10	4
Lack of differentiation	6	6.31	4	3.31	5
Lack of interventions	6	6.38	6	2.53	4
Poor L1 skills	7	6.54	5	3.13	4
Lack of teaching resources	8	7.53	8	3.00	4
Trauma before starting school	8	7.38	9	3.54	5
Age of arrival in the UK	9	7.69	10	3.58	5
Communication difficulties with parents	9	7.53	10	3.05	4
Lack of parental involvement	11	9.61	12	2.65	4

Question 2 What instructional strategies do you routinely offer to break down the barriers mentioned in question 1?

Synthesis of answers to question two affirms that use of visual aids and collaborative learning are the most commonly used approaches to teaching children with English as an additional language, based on the median and modal responses. Differentiated support and the teaching of vocabulary were also popular methods. Stability of responses from round two to round three adds validity to the rankings. However, the large IQ range (6) and SD (3.05) of collaborative learning suggest that consensus was not reached on this matter. This may be a result of the general lack of guidance on teaching EAL children in the UK (Foley et al., 2013) and a lack of knowledge around EAL pedagogy (Pye et al., 2016) and how children acquire language (Cajkler & Hall, 2009). Consequently, there is no agreement on the best methods for teaching EAL children in the UK. Teachers across the country are currently approaching EAL support using a variety of different methods with no consensus as to what works best.

Table 43 *Instructional strategies ranked from most offered to least offered*

	Median	Mean	Mode	SD	Interquartile range
Visual aids	2	2.23	1	1.89	1
Collaborative learning	3	4.07	1	3.05	6
Vocabulary teaching	3	4	3	1.78	2
Differentiation	4	4.69	2	2.64	3
Simplifying language	6	6.38	4	2.50	5
Spoken language use	6	6.23	6	2.66	3
Reading encouragement	7	7.46	7	1.82	2
Interventions	6	6.31	9	2.58	4
Collaboration with specialists	6	5.85	10	2.66	3
Cultural awareness	8	7.77	8	1.53	2

Collaborative learning has been an approach with increasing popularity in schools, as seen by such schemes as the Young Interpreters (EMTAS, 2014) in which children act as language brokers. This approach pairs children with an additional language but who are also advanced speakers of English with children of the same language background but with weaker English skills.

Vocabulary teaching was a support that was ranked highly (M= 4; *SD* = 1.78; IQR =2), however not as high as collaborative learning and visual aids. As we know, vocabulary support can lead to additional benefits for reading comprehension (e.g. Nagy, 1988), a skill which will be beneficial across curricular subjects and in national examinations. Poor literacy skills of EAL pupils was ranked the third greatest barrier to attainment in question 1, however few literacy specific instructional strategies were offered as support for pupils. In fact, reading encouragement was ranked 7th out of 10 strategies, suggesting EAL pupils are not encouraged to read for pleasure, routinely in the classroom. Adult led dialogic reading has shown to enhance children's vocabulary knowledge (see Chapter 2). Furthermore, a meta-analysis of 99 studies found that children with more exposure to print improve their comprehension, technical reading and spelling skills year on year throughout schooling (Mol & Bus, 2011) and even poor readers benefited from independent reading for pleasure. It is therefore surprising that children with EAL are not routinely encouraged to read for pleasure while at school, however, a lack of staff to support the children with the weakest English language skills may be a barrier to this.

Considering the modal answers, collaboration with specialists, cultural awareness and interventions are the support that is offered least. A recent systematic review (Oxley &

DeCat, 2019), highlighted that there was a lack of specialised language and literacy interventions for children with English as an additional language, especially taking place in the UK, this Delphi study adds to the body of evidence that interventions targeting EAL children are lacking in the UK.

Furthermore, collaboration between teachers and researchers who specialise in bilingual pedagogy is recommended, in order to build an evidence based approach to learning. This Delphi has highlighted that teachers do not feel like they understand enough surrounding *how* EAL pupils learn language. As EAL is not a subject within its own right on the National Curriculum, teachers are using different methods across the UK. Whilst evidence suggests targeted language and literacy interventions for EAL children can lead to language growth (Oxley & de Cat, 2019), interventions were not rated as a highly offered support tool for EAL pupils in this Delphi (8th out of 10). At round 1 of the Delphi, teachers were asked open questions about the support they offer and would like to offer if they had the resources. Interventions were highlighted as a tool used to support newly arrived pupils to acquire functional, communicative language; *"intensive support for new arrivals; where possible interventions"* as well as a tool that teachers would like to offer but are unable to *"intensive early intervention to accelerate pupils' acquisition".* As language related interventions can be time consuming and expensive to implement (e.g. Delano, 2007; Ozonoff & Cathcart, 1998; White, Taylor & Moss, 1992), it may be that once functional, communicative language is achieved, children are no longer taken out of class to experience intensive language related interventions and instead are expected to 'catch up' through language exposure in class alone.

Question 3(i) What additional support would you like to offer if you had the resources?

Table 44 *Additional support teachers would like to offer, from support most wanted to least wanted*

	Median	**Mean**	**Mode**	**SD**	**Interquartile Range**
Bilingual support staff in the classroom	1	2.92	1	3.07	3
Small group English language classes	3	3.3	2	1.90	2
CPD/training for staff	3	4.61	2	2.98	4
Qualified EAL teachers	4	3.92	3	2.46	4
More one-to-one time with pupils	5	5.3	4	2.37	3
Interventions for EAL pupils	5	5.38	5	1.64	3
Bilingual resources in wide range of languages	7	6.85	6	2.51	3
More speaking practice in English	8	7.46	9	1.87	2
English lessons for parents	8	7.61	7	1.98	2
Collaborative learning	8	7.61	9	1.78	2

It is perhaps not surprising that the resource that teachers covet most is bilingual support staff, as this would ensure immediate communication with children and their parents who are new to English. The next resource that teachers would like is small English language pull out classes for those with English as an additional language, as well as more continued professional development to develop teachers' understanding.
The resource ranked lowest was collaborative learning. The previous question highlighted that collaborative learning was something that was already strongly implemented across the teachers surveyed in this Delphi, which is potentially why it was ranked low for this question, as it is a practice already taking place in classrooms. Interestingly, more speaking practice in English during lessons was ranked equally low, which may be for the same reasons.

As part of the same question, teachers were then asked to rank any barriers to the resources they would like to implement.

Question 3 part 2 Are there any barriers to this?

Funding remained stable from round two to three as the greatest barrier teachers faced when sourcing resources for children with English as an additional language. Work load ad staffing were the smallest barriers to additional support, which is surprising considering teachers rated additional support staff and specialist EAL staff as support they most wanted in the previous question.

Table 45 *Barriers to additional support teachers ranked from greatest to smallest.*

	Median	**Mean**	**Mode**	**SD**	**Interquartile Range**
Funding	1	1.23	1	0.42	0
Lack of knowledge/training	3	3.08	3	1.48	3
Class Size	3	3.23	5	1.27	2
Work load	4	3.92	4	0.92	2
Staffing	4	3.54	4	0.93	1

Funding continues to be an issue in UK schools. Between 2000 and 2010, there was an annual growth of funding per pupil in English schools of around 5%, however between 2012 and 2015, education capital funding was cut by around a third. Between 2015 and 2017, there was a fall in funding for UK schools of 5%, with a current freeze in pupil funding in place and set to last until the end of 2019 (National Foundation for Education Research, 2018). It is apparent from the results of this Delphi that a funding shortage in UK schools is having implications for children with English as an additional language, the numbers of whom in the English school system are rising year on year.

7.7 Discussion

In this report, a final panel of 13 teachers ranked a lack of knowledge and pedagogy surrounding children with English as an additional language, and a lack of staff with specialist EAL knowledge as the greatest barriers to achievement for children with EAL. Furthermore, teacher collaboration with language specialists was not a routinely offered support for children with EAL and more continued professional development or training for staff was one of the resources most coveted by teachers. These rankings are not surprising, considering a report by the National Association for Language Development in the Curriculum (NALDIC, 2009) found inconsistencies in professional development provisions in the UK. A report by the Bell Foundation (2018) found that the UK is lagging behind other countries in regard to what EAL specialist support is available (Hutchinson, 2018: Bell Foundation report). This report incorporated a case study of EAL provisions in different locations across the (English speaking) world. Continued professional development was widespread across these locations. In New Zealand, scholarships were available to study EAL pedagogy at University level. In Minnesota, (USA), there were specialist EAL teacher certifications requiring specific CPD accreditation with funds available to incentivise EAL-specific professional development. Similarly, in New York, teachers were required to complete a minimum of 26 hours of EAL specific CPD, with extra funds available to facilitate EAL programmes. New South Wales (Australia) employed specialist EAL teachers to support mainstream teachers, who delivered CPD. Specific EAL related teachers standards also existed to check teachers' knowledge and progress. The Bell Foundation report recommends that the UK should learn from countries such as the USA, Australia and New Zealand, where effective policies exist to establish specialist EAL staffing and programmes for staff development.

In addition, there is no EAL specific teacher training subject in the UK, and EAL is not a requirement for the training of mainstream teachers (Foley, Sangster, & Anderson, 2013). Consequently, newly qualified teachers feel underprepared to teach EAL children when they start in their roles (Pye, Stobart, Lindley, & Mori, 2016) and the findings of this study suggests that this ill prepared feeling continues long into the profession, as the mean years teaching of the participants in the final round was 11 years (range 0.5-30). Continued professional development, giving teachers knowledge of how to teach language and literacy related skills to children with EAL is imperative, as it is likely to yield long-lasting effects on attainment, especially as assessments in the UK encompass a high proportion of written language to be comprehended.

In the current study, poor English vocabulary and literacy skills were ranked in the top four barriers to educational achievement for children with EAL, after a lack of pedagogical knowledge and specialised staff. Thus, children's poor oral language and literacy skills were viewed as the greatest barrier to achievement at pupil level, after teacher related barriers. There is a strong relationship between children's oral language skills and literacy for EAL children (Diane August & Shanahan, 2006). A similar questionnaire of teachers regarding EAL children (Cajkler & Hall, 2009) found that linguistic and cultural issues were the third most highly ranked training need identified, with teachers wanting more professional development about language awareness and input on how a second language is learned, suggesting that teachers have wanted language specific training for EAL pupils for almost a decade and are still unable to access such training.

Language and literacy difficulties, including vocabulary, were ranked highly as barriers to educational achievement during both rounds of the Delphi. However, both vocabulary and language related skills were ranked only moderately high as support routinely offered; in the forms of differentiation, vocabulary teaching, simplifying language and use of interventions. No strategies that were directly related to literacy skills were identified as support that was routinely offered, apart from reading encouragement which was ranked 7^{th} out of 10. Support that was wanted also did not identify any specific literacy support, however ideas such as bilingual language support staff, small group English language classes for EALs, more one-to-one time with pupils and targeted interventions were identified, which may relate to language and literacy skills. However, open responses during round one suggest that interventions are offered mainly to new to English children in order to accelerate their language skills to a communicative level. Although empirical evidence exists that language and literacy interventions can yield language growth in EAL children (see Chapter 2), evidence also clearly shows that there is a lack of such interventions taking place in the UK, (Oxley & de Cat, 2019) which may be down to a lack of knowledge surrounding how children acquire language (Cajkler & Hall, 2009). Cajkler & Hall (2009) carried out a survey of teachers and found that linguistic and cultural issues were the third most highly ranked training need identified. Teachers wanted more professional development about language awareness and input on how a second language is learned. Furthermore, a desire to understand how to effectively differentiate for EAL learners was identified, suggesting a lack of knowledge from teachers both about how language is acquired, and how to scaffold language appropriately so that pupils can learn independently.

Teachers ranked collaborative learning as one of the resources that they routinely offer to children for whom English is an additional language. Collaborative learning has been a tool used by teaching professionals for many years, with weaker children being supported by more able children in small groups, however such collaboration to enhance language needs is somewhat understudied. Schemes that are in place, such as the 'Young Interpreters' scheme (EMTAS, 2014) encourage children with fluency in both their home language and English, to work alongside a child from the same language background but with weaker English skills. The aims of such a scheme are to enhance the child's access to the curriculum through a peer who can help to interpret. This avoids feelings of isolation due to language barriers for new arrivals. Schemes such as the Young Interpreters can face criticism, in that the more able child's interpreting may be at the detriment of their own learning, and it is the responsibility of the teachers to ensure that the Young Interpreter is still making their own academic progress. An additional obvious barrier to this scheme is that children need to speak the same language, which will not always be possible in schools.

A consensus was reached after round two that funding was the major barrier to teachers' ability to implement support to children with English as an additional language. This result remained stable into round three, giving strong validity to the outcome. Funding across regions in England and Wales is clearly a difficulty which is faced by educators countrywide. In this study, we did not ask the participants to clarify whether they worked in an Academy, Private School or local authority school, however, the validity of the consensus would suggest that funding is a great barrier across schools. In 2011, the government scrapped the Ethnic Minority Achievement Grant (EMAG), with funds being absorbed into more generalised school funding. Since the 2011-2012 school year, the number of local authorities who now offer no central budget for EAL has risen from 39 to 72 (Hutchinson, 2018). Consensus in this Delphi would suggest that the repercussions of the EMAG dissolution are still being felt today by educators. Furthermore, since 2008, there has been an increase of 6.8% EAL pupils in state primary schools and 5.8% in secondary schools, meaning teachers are being ever stretched and this may be impacting on pupil attainment. Whereas evidence suggests that EAL pupils may have 'closed the gap', displaying similar academic performance to monolinguals by the end of state education, (Strand et al., 2015), it is worth noting that these children would have benefitted from EMAG funding in primary school, and results may differ in years to come. Furthermore, evidence suggests that the overall attainment of EAL pupils is masked since the term ‘EAL’ describes a heterogeneous sample of children under which the more able can mask the underachievement of those with more language needs (Demie, 2018). Strand and Hessell (2018), found that pupil attainment is predicted by their English language ability. Whereas those with full fluency in English are outperforming their monolingual peers, children at the other end of the spectrum are vastly underperforming.

Teachers ranked support staff in the classroom, including bilingual support staff, as the resource they would most like to aid the achievement of EAL pupils. Bilingual support staff would clearly be a great advantage for teachers in breaking down the communication barriers between EAL children classified as ‘new to English’. However, the 2011 census found that 88 additional languages are spoken in England and Wales, accounting to 8% of the population (Stokes, 2013). We know from the school census that the proportion of children with EAL is increasing yearly (DfE, 2017; 2018), consequently the reality of bilingual support staff in the classroom who will be able to represent the variety of languages spoken is logistically challenging. Clearly, an increase of more general support staff, who would be able to offer additional individual tuition or small group interventions would be beneficial to EAL pupils, however, since funding was identified as such a barrier to support for EAL children, it is doubtful in the current climate whether schools would be equipped to provide such support.

7.8 Limitations

The current study did suffer from attrition between iterations of responses. Attrition is a common feature of Delphi studies, due to the lengthy process with numerous iterations (Murray & Hammons, 1995). In the first round of the Delphi study, we recruited 30 teaching professionals to take part. By the third iteration, 13 respondents remained. However, as the minimum number for a Delphi panel generally is considered to be 10 expert participants, (Cochran, 1983), we felt that 13 final panellists would still give a representative view of teaching practices surrounding children with English as an additional language. An additional limitation is the narrow scope of this Delphi. We were interested in investigating whether current research into EAL language and literacy teaching methods reflects what is happening in UK classrooms. However, this does not take into consideration the views of additional stakeholders such as parents, teaching assistants or speech and language therapists. We would encourage future research to include these stakeholders to give a holistic impression of the barriers to EAL attainment in the UK.

7.9 Conclusion

A lack of knowledge regarding how to teach children with EAL was demonstrated during every round of this study and remained stable from rounds two to three. Questions one and two informed us that teachers identified vocabulary as a barrier to EAL achievement, but since it was ranked third, we see it is not viewed as the greatest barrier. Vocabulary instruction was routinely being offered as one method to aid the attainment of pupils with English as an additional language, however it was ranked fourth and we were unable to clearly identify the type of vocabulary instruction being offered and whether it was explicit. Therefore, we could suggest that lack of a holistic pedagogical approach to EAL language learning may be an underlying barrier to pupil language achievement throughout school. However, research has found that EAL children consistently have a smaller vocabulary than their monolingual peers (e.g. Mahon & Crutchley, 2006; Murphy, 2014) .Vocabulary knowledge, reading accuracy and fluency can all have a huge impact on reading comprehension for both monolingual and EAL pupils (Anderson & Freebody, 1981; Burgoyne, Kelly, Whiteley & Spooner, 2009). Furthermore, reading comprehension difficulties in mid to late childhood have been found to link to poor pupil attainment at both 11 and 16 years of age (Ricketts, Sperring & Nation, 2014). Findings from a systematic review (see Chapter 2), provided evidence that explicit vocabulary instruction can lead to lexical growth for both monolingual and EAL children. Experiments reported in this thesis found that under explicit training conditions, EAL children had an advantage of spoken word learning over their monolingual peers.

However teachers need to have background knowledge of what constitutes explicit vocabulary instruction and how to effectively carry it out. Goerss et al., (1999) suggest that effective vocabulary learning and retention requires active learning, in which children make personal associations between new words and their own experiences. This is paired with rehearsal and application of the new words, and discussions surrounding the child's new word knowledge. The authors further suggest that memorisation of definitions do not go far enough to sufficiently learn vocabulary, and children need to be taught strategies to aid integration of the new item into their existing vocabularies (Goerss et al., 1999). Biemiller (1999) suggests that children can learn two to three new words per day with appropriate explicit instruction, in which children are taught learning strategies and new words are taught in context.

Continued professional development for teachers, featuring explicit instruction of vocabulary, must be rolled out on a national scale in order to give children with EAL the support necessary to reach their full potential.

Chapter 8: General Discussion

8.1 Summary of aims

This thesis investigated the vocabulary development of children with EAL and their monolingual peers. Emerging literature informed us that EAL children had a smaller English language vocabulary than their monolingual peers (e.g. Bialystok et al., 2009; Hutchinson et al., 2003; Mahon and Crutchley, 2006; Oller & Eilers, 2002; Portocarrero et al., 2007). Furthermore, it was known that vocabulary knowledge in primary school had strong associated outcomes to both attainment (Verhoeven et al., 2011) and wellbeing (Whiteside et al., 2017).

With this in mind, we sought to investigate vocabulary acquisition within a population of children who speak EAL, compared to children who only spoke English.

The aims of the thesis were:

1) To identify key strategies from the literature with robust evidence to improve the English vocabulary of children with EAL.

2) To investigate whether strategies to improve the English vocabulary of EAL children were replicable in UK classrooms.

3) To identify if there was a difference between monolingual and EAL children's ability to learn vocabulary using strategies identified.

4) To identify whether children's ability to learn vocabulary through the strategies predicted English vocabulary growth.

5) To investigate whether the strategies identified through the systematic review and empirical studies reflected current practice in UK classrooms, or whether teachers prioritised different learning methods when teaching EAL children.

We carried out a systematic review in order to identify intervention studies with robust evidence of vocabulary growth within a population of children with EAL. We then designed and carried out two experimental studies of nonword learning, to investigate whether children with more than one language had an advantage when learning six newly encountered words. A longitudinal follow up was carried out in order to investigate the contributions to vocabulary growth for children with EAL.

Finally, we carried out a Delphi questionnaire with teachers, in order to identify the barriers children with EAL face when accessing education. We additionally investigated the strategies used by teachers to address these barriers, and the resources most coveted but inaccessible for teachers to overcome the identified barriers.

The following chapter will identify the key contribution to the literature that this thesis has made.

8.2 Key Contributions to the literature

The systematic review highlighted a paucity of high-quality interventions carried out in the UK to address the vocabulary needs of primary school children with EAL. Evidence from the USA suggests that explicit vocabulary instruction interventions can quickly and effectively enhance vocabulary acquisition for both children with EAL and their monolingual peers.

We have demonstrated that explicit vocabulary instruction carried out in an experimental setting gives an immediate advantage of recall to EAL children. This is despite EAL children having a significantly smaller receptive and expressive vocabulary in English than the monolingual children we tested.

However, when learning was implicit we found that immediate novel word recall was disadvantaged for children with EAL in comparison with monolingual children. Explicit experimental word learning predicted vocabulary growth in English over one year for children with EAL. The ability of EAL children to learn the phonological aspects of novel words significantly predicted English vocabulary growth over one year, whereas standardised measured of phonological memory did not. In contrast, novel word learning ability did not predict English vocabulary growth for monolingual children, which may be due to the task's similarity to second language learning, rather than first language acquisition.

Teachers provided evidence that lack of vocabulary knowledge was the greatest barrier at pupil level to academic achievement. From teachers' perspectives, a lack of knowledge around EAL pedagogy was seen as the greatest barrier to pupil attainment. Teachers identified funding as a major barrier to implementing the resources they would like to help children with EAL. This suggests that teachers may feel their hands are tied. They are aware of resources they could use which would improve EAL children's language and attainment, however, with tighter school budgets, such resources are unobtainable.

8.3 Contribution to knowledge

The research presented in this thesis makes a unique contribution to the body of literature surrounding vocabulary acquisition for children who speak EAL. It is the first research of its kind to conduct both explicit and incidental novel word learning experiments with children with EAL in the UK.

The research presented here shows that children with EAL are able to outperform monolingual children on a measure of immediate recall of explicitly learned words, despite a significantly smaller English vocabulary. However, study two shows that incidental word learning through context is a more challenging task for both EAL and ML children, and EALs are particularly disadvantaged without explicit instruction. This suggests that their disadvantage is a result of the significantly smaller baseline English vocabulary, resulting in EAL children being unable to decipher the context of the narrative.

While study 1 showed that with explicit help, children with EAL may be able to bridge the vocabulary gap between their monolingual peers, it highlighted that the initial word learning advantage of EALs is not robust after a delay. Future studies and interventions must find a way to capitalise on the advantage EAL children have of encoding the initial word form. Support may then be targeted to the longer term aspects of word learning and could lead to longer lasting vocabulary gains.

As much of the vocabulary children learn from school onset is incidental (Biemiller, 2003) results of study 2 show that we should not rely on incidental vocabulary acquisition for EAL children. This raises the case for a need for explicit interventions in the UK for EAL children, as without targeted help, the vocabulary gap may widen and children will fall further behind. These interventions should use explicit word learning tasks (e.g. Carlo et al., 2004; Dalton et al., 2011; Lesaux et al., 2010; Proctor et al., 2011) or dialogic reading with embedded explicit features, such as pre-teaching of vocabulary or embedded definitions (e.g. August, Artzi, & Barr, 2016; Collins, 2010; Crevecoeur, Coyne, & McCoach, 2014; Pollard-Durodola et al., 2016; Vadasy &

Sanders, 2015b). Interventions to support EAL children are likely to be beneficial for children of all language backgrounds with weaker vocabularies.

The systematic review identified a lack of targeted vocabulary interventions for EAL children in the UK. A lack of literacy and oral language interventions has also been found in the UK for both children and adolescents (Oxley & de Cat, 2019). The research presented here strengthens the case for explicit interventions in the UK. While we found that English vocabulary growth for children with EAL was uniquely predicted by their ability to learn the phonological aspects of novel words, it may be of use to harness their phonological strengths in future word learning interventions for EAL children.

Moreover, the ability to learn the phonological aspects of novel words predicted vocabulary growth, whereas a standardised measure of phonological memory did not. This suggests that dynamic assessments may be more sensitive to the language learning potential of children with EAL rather than static measures, which may be influenced by exposure to English. Consequently novel word learning measures could help identify those who struggle to learn as a result of an underlying language disorder.

8.4 Main findings

In chapter 1 we identified that the numbers of children with English as an additional language are increasing in UK primary schools year on year. Despite the binary label, children with EAL are a heterogeneous group incorporating a spectrum from those new to English to those who are English dominant, but have some knowledge of another language.

Children with EAL tend to have a linguistic profile of strengths and weaknesses. Phonological strengths are evident in decoding skills (e.g. Kaushanskaya & Marian 2009a) leading to heightened reading accuracy and fluency in English. However, these skills do not translate to English language comprehension skills, with EAL children tending to be weaker at both reading and listening comprehension, vocabulary knowledge and grammatical abilities (e.g. Bialystok et al., 2009; Demie, 2018; Hutchinson, 2018; Mahon & Crutchley, 2006; Oller & Eilers, 2002; Portocarrero et al., 2007; Murphy, 2018).

We carried out a systematic review (see Chapter 2) to identify high quality interventions carried out with children with EAL to enhance their English vocabulary. Four databases were searched using terms derived from the PICOS method; PsychInfo, British Education Index, Web of Science and Educational Resources Information Center. The database searches resulted in 6789 studies to screen, of which 23 were eligible for inclusion. The interventions took place mainly in the USA (22 of 23 interventions). There was a notable lack of eligible intervention studies for EAL children within the UK. This was problematic, in that it limited the scope of analysis. We aimed to find studies which would improve the vocabulary knowledge of children in the UK context with English as an additional language, however children from the USA mainly spoke Spanish as their first language. In the UK context, children speak a range of first languages, as demonstrated by the populations studied in chapters three and four. Whilst it is important to understand which interventions proved useful to the American context, we must appreciate that certain methodologies would not be reproducible in the UK, such as use of home language cognates or direct translations. Despite this limitation, the review provided evidence that explicit vocabulary training in context did produce word learning gains for some children. The EAL children were able to learn at the same rate as monolingual peers in most studies. With this in mind, we designed an explicit word learning experiment to investigate whether such methodologies may prove fruitful for EAL children within the UK.

In study 1, (see Chapter 4) an explicit word learning experiment was conducted to determine whether EAL children would benefit from direct instruction when learning vocabulary. This was compared to the ability of a sample of monolingual children of the same age who were from similar areas of social deprivation. In order not to bias the monolingual children, novel items were chosen over English words, in a replication of Gellert and Elbro (2013). Modifications to the original task were carried out, such as converting the task to experimental software (DMDX) and updating the visual stimuli for on-screen clarity. Despite EAL children having a significantly smaller receptive and expressive English vocabulary, our findings revealed that EAL children displayed a significant advantage for recalling novel word forms immediately after training, when compared to their monolingual peers. We put this down to an advantage in the phonological domain. Such advantages have been noted in additional word learning studies on bilingual adults (e.g. Kaushanskaya & Marian, 2009).

The same novel words as experiment one were then embedded into a recorded story that children listened to via headphones (see Chapter 5). We sought to determine whether the same benefit EAL children exhibited during explicit training of novel words would occur when learning was implicit. Results from the systematic review suggested EAL children would have smaller vocabulary gains from implicit learning, and this was confirmed by the experiment. Monolingual children displayed a significant advantage of immediate recall. This is likely due to monolingual children's significantly larger English receptive and expressive vocabularies, which enabled them to infer the semantic meaning of the novel items from context. Although recall specifically assesses phonology, this test used semantic information about the novel words to test learning. The children were asked '*what was the name of the old, grey, singing bird*', therefore it was necessary for the children to have previously inferred through context which novel item was a bird.

EAL and monolingual children's vocabulary growth over twelve months was then calculated (see Chapter 6). We entered this into a hierarchical regression analysis to see if experimental measures of word learning could predict English vocabulary growth. Findings indicated that EAL children's vocabulary growth was predicted by their ability to learn the phonological forms of nonwords, over and above their ability to learn the semantics of the words, providing more evidence for the phonological advantage of bilinguals (e.g. Bartolotti & Marian, 2012; Bartolotti et al., 2011; Kaushanskaya, 2012; Kaushanskaya & Marian, 2009a, 2009b; Van Hell & Mahn, 1997; Wang & Saffran, 2014). The ability to learn the phonological aspects of nonwords significantly predicted English vocabulary growth for EAL pupils, whereas a standardised measure of nonword repetition, measuring phonological memory, did not significantly predict EAL children's English vocabulary growth. This may suggest that a dynamic assessment of vocabulary learning ability is more sensitive to EAL children's vocabulary growth potential than traditional, standard assessments.

A Delphi questionnaire (see Chapter 7) was carried out to explore teachers' views about vocabulary learning in the classroom for EAL children. It additionally sought to elucidate current classroom practice, aimed to improve the vocabularies of EAL children. Thirty one teachers were recruited to take part in the three round survey, with 13 teachers remaining by the final round. Key findings from the Delphi study indicate that there is a lack of knowledge and pedagogy surrounding children with English as an additional language, resulting in a lack of staff with specialist EAL knowledge. Furthermore, teachers are aware of this gap in knowledge and support and want more professional development and collaboration with language specialists. Teachers' considered that poor English vocabulary and literacy skills were the greatest barrier to educational achievement at pupil level (after teacher level barriers of lack of knowledge and specialised staff) yet related skills were ranked only moderately high as support routinely offered, in the forms of differentiation, vocabulary teaching, simplifying language and use of interventions. The only literacy related reading strategy that was routinely offered was reading encouragement, which was ranked 7th out of 10. Support that was wanted also did not identify any specific literacy support, however ideas such as bilingual language support staff, small group English language classes for EALs, More one-to-one time with pupils and targeted interventions were identified, which may relate to language and literacy skills

8.5 Implications of findings for future research and practice

8.5.1 Implications for future research

Evidence suggests that children with more than one language are advantaged when explicitly learning a new label for an already known object (such as animals). One experimental study has found that emergent bilingual children perform at the same level as monolingual children when learning a novel label mapped to a novel concept (Kaushanskaya, 2014). However, no such research has been carried out in a population of children with English as an additional language. It is currently unknown whether the advantage of immediate recall displayed in this thesis is a result of an overall advantage of word learning, or whether it is due to the bilingual children having more experience of mapping additional labels to previously known referents. For such a claim of a word learning advantage to be made, evidence would need to be collected comparing both monolingual and EAL children's ability to learn novel words for both unknown concepts (such as aliens or novel shapes) and known concepts (such as animals). Kaushanskaya (2014) use a forced recognition task as the only measure of novel word learning in her study. In the explicit word learning task in this body of research (see Chapter 4), novel word recognition was at ceiling for all participants immediately after learning and was still close to ceiling one week after, despite recall scores being much more variable, therefore it is questionable the extent to which recognition tasks suffice to draw conclusions on the word learning abilities of certain groups of children. More rigorous studies are needed using both recall and recognition as measures of word learning.

When novel word learning was introduced through an implicit task, in which children listened to stories containing unknown words, both recall and recognition ability for all children was reduced compared to when the task was explicit (see Chapters 4 and 5). This highlights the difficult task of acquiring words without direct instruction. However, the difficulty of acquiring novel words incidentally was greater for the EAL children. This would suggest that baseline English vocabulary knowledge scaffolds vocabulary learning while listening to narratives. Consequently, those with the smallest English vocabularies were less able to use context to deduce the meanings of novel words, and this is true also for ML children with smaller than average vocabularies.

This may have implications for true vocabulary acquisition through context. This study suggests that those who know the fewest words are less likely to comprehend what they are listening to, which causes difficulty acquiring newly encountered words incidentally.

Research has suggested that repetition of vocabulary items can lead to enhanced lexical representations in memory (e.g. Schwab & Lew-Williams, 2016). However, differing contexts may lead to stronger lexical consolidation (Henderson & James, 2018). It may be of use to compare repeated reading exposures, in which children hear novel words in the same stories, read to them on multiple occasions, to differing contexts, in which children hear the same novel words in different stories, thus with different contextual information. It would be of interest to compare these two conditions within a population of EAL children. Henderson and James (2018) compared monolingual children's novel word acquisition through stories in either repeated reading conditions or differing contexts. Henderson and James found that differing contexts led to the greatest novel word gains for monolinguals, however for EAL children it may be that they are enhanced by repeated readings of the same stories, as found for younger monolingual children (Williams & Horst, 2014). Under this condition, EAL children may benefit from repeated readings of the same story to better understand the contextual information surrounding the novel vocabulary. Williams and Horst (2014), found that monolingual three year old children, who naturally have a smaller vocabulary due to age, benefitted from repeated readings of the same stories. Learning words from different stories is more difficult than learning from the same stories, (Horst et al., 2011; Williams et al., 2011), which may be because contextual repetition reduced the linguistic demands of story comprehension, leaving children more attentional resources to dedicate to the new words they heard (Horst et al., 2011).

Future research should consider repeated exposures to novel words in order to understand whether the EAL explicit advantage or the ML implicit advantage is maintained, and whether repeated exposures lead to lexical consolidation.

8.5.2 Implications for practice

Since a lack of EAL professional development was identified as a barrier to educational achievement by teachers in the Delphi study, with few specific language and literacy related strategies offered to EAL children, we would recommend future research into teacher focused interventions. This approach, in which teachers are equipped with the skills to carry out their own research driven practice, would have far lasting implications on children's learning.

Furthermore, evidence from the systematic review and the empirical studies in this thesis revealed that explicit instruction can provide the largest vocabulary gains for those with the smallest initial vocabularies. However, reading and listening to stories is still an important pedagogical tool, and is still very much encouraged for both children's literacy and social development, even though stories alone are not enough to close the vocabulary gap for EAL children. If stories are used as a tool for vocabulary growth for those with the smallest vocabularies, it is the responsibility of the teacher to ensure that the child is able to comprehend what they are reading, as this may hinder vocabulary acquisition and could result in a displeasure for reading. Educators should use dialogic approaches as documented in the systematic review to both ensure comprehension and scaffold vocabulary growth. This would have a reciprocal relationship to reading for pleasure, the more a child enjoys reading at school, the more inclined they will be to read in the home which will increase their exposure to print and will facilitate future language growth.

It should also be recommended that children read and are read to in their first language, where possible (e.g. where the language has a written form) in order to help children become biliterate. Biliteracy in children can be beneficial for both their L1 and L2 development, leading to improved symbolic understanding of print (Bialystok, 1997), alphabetic knowledge (Naqvi, Thorne, Pfitscher, Nordstokke & McKeough, 2013), phoneme awareness (Bhide, Gadgil, Zelinsky & Perfetti, 2014), text reading accuracy and comprehension (Leikin, Schwarz & Share, 2010). Schools should encourage the practice of biliteracy by stocking books in a range of languages in the school's library. Finally, we have demonstrated that EAL children's ability to learn the phonological aspects of non-words can predict English vocabulary growth (see Chapter 6). This may help to identify EAL children who have an underlying language disorder, compared to proficient word learners who have smaller English vocabularies due to lack of English exposure. This finding may also be transferable to other international contexts in which children are schooled in a language that is not spoken in the home. As the dynamic assessment in this thesis used novel words, it could be used in countries with languages other than English with relative ease. In several countries, a gap in attainment can be seen between native speaking children and those with an additional language, like the case in the UK. For example, in Germany, repeated studies have shown a large gap in reading proficiency between native speaking children and children with an additional language (Baumert & Schümer, 2001; OECD, 2001; Stanat & Christensen, 2006), as a result, children with an additional language are less likely to attend the more academic

German grammar school, and are more likely to attend vocational schools than their native speaking peers (Baumert & Schümer). Large gaps between monolingual children and those with an additional language are also apparent in Sweden (Çelikaksoy & Wadensjö, 2015; Grönqvist & Niknami, 2017). Assessing whether children with an additional language are underperforming due to a language disorder or a lack of exposure is a challenge for educational professionals and speech and language therapists alike. It is important that both teaching professionals, including EAL specialists and special educational needs co-ordinators (SENCos), are able to accurately assess children and make correct referrals to speech and language therapists (SLTs). The dynamic assessment that we used did predict vocabulary growth for EAL children, and therefore could have far reaching implications both in terms of screening for language disorders in schools, and with speech and language therapists. More research is needed to test this dynamic assessment with a larger cohort of both EAL and ML children.

8.6 Limitations

The studies in this thesis are subject to a number of limitations. Firstly, due to the nature of children with English as an additional language, it was difficult to control for children's knowledge of their first language. Since the final sample of EAL participants resulted in 27 different languages, assessment in the L1 was not feasibly possible. Furthermore, few standardised language measures exist in the range of languages in this study. In order to attempt to control for first language knowledge, we attempted to send home a parental questionnaire. However, due to the hard to reach nature of parents across our studies, the return rate was low (12 questionnaires returned out of 67). This may have been due to parent's limited English language knowledge (the language of the questionnaire). As a result, we designed an oral pupil questionnaire (see Chapter 3). Although a subjective measure such as this may have led to inaccurate responses, it was a useful tool to glean overall background information about the children's language preferences and usage. Future studies, where possible, should use both subjective and objective measures of language background to create a reliable picture of children's language abilities in all languages they are exposed to. Objective measures, such as standardised assessments, should be used to identify the first language competence of the sample, if such tests are available in the children's home languages. Further work to develop and validate in school or child based assessments of language exposure is crucial to give an accurate representation of EAL children's language knowledge.

In order to match for socio-economic status (SES) of the pupils from EAL and ML backgrounds, schools were recruited from similar indices of social deprivation, based upon school postcode. Lower SES status can have implications for language knowledge and ability. Children from lower SES backgrounds begin school with a smaller vocabulary than their higher SES classmates (Graves et al., 1982; Hart & Risley, 1995; Moats, 2001; White et al., 1990). Hart & Risley (2003), for example, found that children from areas of higher social economic status had exposure to approximately 30 million more words prior to school onset than those from lower SES areas. An educational disadvantage as a result of social deprivation starts before school, and this gap persists throughout school (Biemiller, 2001; Hart & Risley, 1995; Juel et al., 2003). It is possible that ML children from areas of lower social deprivation may have performed differently across measures. Due to time constraints of this study, it was not possible to have a wide range of social backgrounds of participants. Future studies should include both high and low SES EAL and ML children in order to explore the contribution of these factors, and to control for them when needed.

The criteria for participation in all of the empirical studies in this thesis were that children with EAL who had been in mainstream education in an English speaking country for a minimum of one year and who did not have any diagnosed speech and language impairments or special educational needs which may hinder language development (such as a hearing impairment). Consequently, all children were able to fully communicate in English, understand instructions and complete the experimental tasks. This may not therefore be fully representative of children in mainstream classrooms with EAL who are new to English or who may have speech and language difficulties.

Evidence suggests that children with EAL can be over-diagnosed as having a speech and language impairment by speech and language therapists due to a paucity of diagnostic tools in the child’s first language (Adler, 1990; Ball & Bernhardt, 2008; Kritikos, 2003; Pray, 2003; Terrell & Terrell, 1983). Conversely, children may not be diagnosed (Flipsen, 1992; Holland, 1983; Tonkovich, 2002) due to the child’s poor language proficiency being put down to a lack of language exposure when in fact the roots of the deficit are a specific learning disorder. Consequently, children may have been excluded from our sample due to being mis-diagnosed with a speech and language impairment when simply their language deficit is due to lack of language exposure. Conversely, children may have been included in the sample who have an undiagnosed impairment.

Much reference in linguistic research has been given to the relationship between L1 and L2 vocabulary size (e.g. Verhallen & Schoonen, 1998; Vermeer, 2001; Wolter, 2006). Due to the diverse range of children's first languages in the current study, and an overall dearth of vocabulary assessment measures in diverse languages, it was an impossibility to measure children's overall vocabulary knowledge across both of their known languages. As a proxy, we measured children's perceived language profiles through an oral questionnaire delivered to the children.

8.7 Conclusion

This thesis examined vocabulary acquisition in a population of monolingual English children, and children for whom English is an additional language.
We identified that teachers in the U.K. currently feel ill equipped and ill prepared to teach children with EAL and lack understanding of pedagogical methodologies to best support EAL pupils. While teachers are carrying out vocabulary training in the classroom, we were unable to identify the types of vocabulary instruction being carried out. We have demonstrated that novel word learning, when it is similar to second language learning, can advantage EAL children over monolinguals when the instruction is explicit. It is encouraging that EAL children are better equipped to learn vocabulary under explicit conditions as this pedagogical strategy could help EAL children to bridge the vocabulary gap that exists between them and their monolingual peers. Without direct instruction, we found that EAL children are disadvantaged at word learning. This would suggest that without direct instruction of vocabulary, children with smaller vocabularies are less able to acquire new words without instruction.

We also found that experimental learning can predict English vocabulary growth for EAL children. This is an important contribution to the literature, as standardised measures of English vocabulary can be biased towards monolingual children. Consequently, EAL children may be under or over diagnosed as having a language disorder. This thesis provides encouraging evidence that dynamic assessments can be developed for EAL children, which could help identify EAL children with an undiagnosed language disorder.

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Appendix 1: Risk of Bias assessment in systematic review

Bias Domain	**High Risk**	**Medium Risk**	**Low Risk**
Random Sequence Generation	The individual sequence is non-random and may lead to confounding, such as a child being allocated by class teacher	A component is used to randomise, such as computer generated software, but randomisation occurs at group level, such as by class or by school	A component is used to randomise such as dice throwing, shuffling enveloped or using computer generated random numbers. Randomisation occurs at individual participant level.
Blinding of participants and personnel	Intervention is led by school staff (e.g. teachers or assistants). Children are aware they are undergoing intervention and are aware of the intended outcome	Intervention is led by school staff but children are not told of intended outcome	Leaders of intervention are independent of school staff (e.g. independent research team). Children are not told of intention of intervention.
Bias in the measurement of the outcome	Researcher developed measures are used as sole outcome assessment. No reliability is discussed. Conclusions are drawn from these outcome measures only.	Researcher developed assessments used alongside standardised measures.	Standardised assessments used for every outcome measure. Where researcher developed outcome measures are used, these are appropriately tested for reliability against standardised measures. Where researcher developed outcomes are reported, conclusions are drawn based on both standardised and researcher-developed measures.
Incomplete Outcome data	Substantial missing data or attrition of	Outcome data is available for nearly	Outcome data is available for all

	participants in one or more intervention groups	all (equivalent to a low or modest amount of missing data)	who took part in the intervention
Selective Reporting	Clear evidence that a domain was measured in multiple ways but data from only one/a subset of measures fully reported (without justification). For example, tests mentioned in a pre-registration protocol or the methods section of the paper are not reported in the results.	Evidence that all reported results for the outcome domain correspond to all intended outcome measures. All measures mentioned in the methods section are reported in the results. If they are not, clear and reasoned justification is given.	Clear evidence that all reported results for the outcome domain correspond to all intended outcome measures. Where pre-registration has been used, trial protocols and statistical analysis plans correspond to reported outcomes.

Appendix 2: Descriptive characteristics of studies in systematic review

	Study	L1	Sample Size	Age	Type of Intervention /Comparator Group	Length of intervention	Nature of intervention	Findings
1	August et al., (2016)	Spanish	509	8-10	Interactive shared reading with two vocabulary instruction conditions: **Extended instruction** teacher provides rich, multimodal vocabulary instruction **Embedded instruction** Definitions embedded in-text	1 hour/day x 5 weeks	Academic shared reading with explicit features Within-subjects- all children took part in both interventions but with different words.	Extended instruction more effective but embedded instruction also helped EALs acquire general vocabulary
2	Baker et al., (2016)	Spanish	78	6-7	Explicit vocabulary instruction **Treatment Group** Instruction given on ‘transition elements’ supporting skills transfer from Spanish to English **Comparator Group** Business as Usual from commercially available programmes	60 days, 30 min/day, 5 day/week x12 weeks	Longitudinal RCT Explicit vocabulary instruction using home language support	Significant gains occurred pre to post test for both intervention participants and control participants
3	Carlo et al., (2004)	Spanish English	254	11-12	Explicit vocabulary instruction with strategies **Treatment Group** New vocabulary encountered in ‘meaningful text’ with Spanish language for EALs Inferencing strategies taught. **Comparator Group** Business as Usual	15 weeks 30-45 minutes 4 days/week	Academic vocabulary explicit instruction. Quasi-experimental	Intervention effects as high for EALs as monolinguals Intervention effective in vocabulary development and reading comprehension. Explicit approach to vocab appropriate for EALs.

4	Cassady et al., (2018)	Spanish	1490	5-7	**Treatment Group** Experimental computer-assisted instruction (CAI) condition Children receive direct individualised instruction in (a) phonological awareness, (b) phonics, (c) fluency, (d) vocabulary and (e) comprehension **Comparator Group** Business as Usual	20 minutes 4-5 x/week x one academic school year	Longitudinal computer aided explicit instruction. EALs tracked over one academic year using a nationally normed standardised reading test.	Experimental condition showed greater gains compared with the control students in vocabulary, phonics, phonological awareness and text comprehension.(6-7 year olds) Gains for younger children (5-6) less consistent but lowest language proficient students experienced greater gains in vocabulary when compared with controls.
5	Castro et al., (2017)	Spanish	340	4	**Treatment Group** Teacher professional development (PD) alongside language, literacy, and social-emotional development, and mathematics learning **Comparator Group** Business as usual	One academic year	Professional development intervention specifically targeting language development of EAL children.	EALs in treatment classrooms showed greater gains in expressive vocabulary in English than EALs in control classrooms, and, when assessed in Spanish, gains were higher in receptive vocabulary, alphabet knowledge, writing and early mathematics.
6	Collins (2010).	Portuguese	80	4-5	**Treatment Group:** Embedded vocabulary explanation and home reading practices from storybook reading. **Comparator Group:** Stories read without explanations. **Control:** Business as Usual	1x weekly for 12 weeks	Researcher-led read alouds with rich definitions:	Targeted vocabulary explanation, initial L2 vocabulary, and frequency of home reading make significant contributions to sophisticated word learning from story reading.
7	Crevecoeur et al., (2014).	English Spanish Farsi (n=1) Haitian Creole (n=1)	122	5-6	**Treatment Group:** Storybook intervention with explicit teaching. **Comparator group:** Business as Usual	36 half hour sessions x 8 weeks	Shared reading intervention	Participants performed better if they were (a) in the treatment condition (b) ML rather than EAL

								Treatment EALs and treatment MLs most likely perform equally well on post-test target-word and general receptive vocabulary measures if similar initial English general receptive vocabulary knowledge.
8	Dalton et al., (2011).	English Spanish 'other'	68	10-11	'Improving Comprehension Online' 3 x treatments **Comprehensive strategy** Students read and are prompted to use reading strategy. **Vocabulary:** Pre-and within-reading vocabulary activities of 40 "power words" (5 per text). Students added words to personal digital glossaries and listened to language alerts **Combination:** Features from comprehension and vocabulary combined	2x weekly for 24 sessions	Quasi experimental intervention using technology assistance (ICON)	Vocabulary and combination groups outperformed strategy group on vocabulary. EALs had difficulty developing vocabulary if it was indirectly addressed through reading comprehension strategies alone. Usual gap between ML and EAL disappeared in vocabulary and combination group
9	Giambo & McKinney (2004)	Spanish	80	5-6 years	Phonological awareness instruction and a storybook comparison **Treatment Group** Phonological awareness (PA) intervention organised around 8 'word-sets' **Comparator Group** Story-reading condition	19 weeks, 60 lessons of 20-25 minutes 3x week	Phonological awareness intervention in which children carried out blending and segmenting activities, with storybook reading comparator group.	No significant differences between group means on pre-test, but significantly differences in scores on the receptive vocabulary measure from pre- to post-test for both groups. Higher effect size for PA group.
10	Goodrich, et al., (2013)	Spanish	94	4-5	**Treatment group:** **English- only intervention:** Explicit vocabulary instruction carried out only in English **Transitional Intervention:** Instruction took place initially in Spanish and transitioned to English in oral language	21 weeks. Small group sessions 4x week, approx. 20 mins	Shared reading and phonological awareness interventions carried out in only English, or in English and Spanish.	Significant main effect of intervention condition on all English language outcomes compared to controls Children with higher initial vocabulary knowledge in one language benefitted more from

					(using dialogic book reading), phonological awareness, and print knowledge **Comparator group:** Business as Usual			the intervention on vocabulary outcomes in the other language than children with lower initial vocabulary knowledge.
11	Lesaux et al., (2010).	English Spanish Vietnamese Lao Hmong Somali Pilipino/Tag alog Other	476	11-12	**Treatment group:** Academic vocabulary program designed for use in mainstream classrooms with high proportions of EAL. Each unit focused on 8 or 9 academic words/day Each unit provided between 3 and 4 exposures to each word **Comparator group:** Business as usual	18 weeks; 8x 2-week; 8-day lesson cycle; 2 1-week review units.	Explicit academic language instruction Text-based academic language program (ALIAS)	Significant program effects on researcher vocabulary outcomes The effect of treatment on a standardised measure of reading comprehension was marginally significant and small in magnitude. No significant effects on a standardised measure of reading vocabulary The intervention was equally beneficial for ML classmates.
12	Marshall & Hobsbaum , (2015).	Arabic Bulgarian Igbo Italian Polish Romanian Somali Urdu	104	4–5	**Treatment group:** Sign-supported English. Vocabulary taught with sign language. **Comparator group:** Business as usual	Six months	Sign supported English (which was already established and routinely implemented in this classroom), compared to a school with no sign supported English.	Main effect was only found for time. SSE had no effect on how well children with EAL learnt English vocabulary: EAL pupils from the SSE school did not learn more words than EAL pupils at the comparison school.
13	O ’Brien (2014).	Spanish Somali Creole Vietnamese Kirundi Kinyarwand a Tamil Amharic Khmer	158	4-9	Family Literacy Programme (FLP) **Treatment:** FLP supported parents’ development of English literacy and taught them effective ways to engage their children in reading **Control:** Business as usual	6-8 hours x12 weeks per semester.	Quasi-experimental study Family Literacy Programme	Children with the lowest pretest vocabulary knowledge achieved greatest vocabulary gains. Gains for treatment and controls with middle and high pretest vocabulary knowledge did not differ significantly (all made gains).

14	Pollard-Durodola et al., (2018).	Spanish	281	4-5	**Treatment 1:** Shared reading **Treatment 2**: Explicit vocabulary-only condition on the vocabulary development of EALs	18 weeks	Shared book reading intervention compared to an explicit instruction condition with no storybooks.	Pre- to post-test growth on taught words for each condition. No significant effects on standardised measures. Differences between book-reading group and vocabulary-only group on outcomes negligible
15	Pollard-Durodola et al., (2016).	Spanish 'Native American language'	252	4	**Treatment Group:** Content-based WORLD shared book reading instruction for vocabulary development of Spanish-speaking preschool children learning English as a second language. **Comparator Group:** business-as-usual shared book reading condition.	18 weeks	Dialogic shared book reading versus book reading only condition	Significant effects of this intervention on intervention specific vocabulary outcomes with no significant effects on standardised vocabulary measures.
16	Proctor et al., (2011)	English Spanish	240	10-11	**Treatment Groups:** ICON Intervention: Children were directly taught five words per text (40 words across 8 texts), along with a digital pre-reading activity, in which students were given a word's definition, Spanish translation, an example sentence and a relevant image. Children listened to the word and then write or audio-recorded a personal connection to the word. **Comparator group:** Normal literacy programme	16 weeks	Explicit instruction of target words that were incorporated into texts.	Not significant for comprehension. Significant effects on researcher developed measures on vocabulary depth but not breadth. When entering vocabulary removed as control, significant language status were present for standardised measures.

17	Silverman & Hines, (2009).	‘wide range of languages including’ Haitian Creole Portuguese Mandarin Spanish	85 used in	4-9	**Treatment 1**: Non-multimedia read-aloud Teachers read each book on 3 days. **Treatment 2:** Multimedia enhanced condition Teachers read each book on 2 days. Then, for 3 days at the end of the cycle, teachers showed children different clips from a related video	45 minutes/day 3x days for 12 weeks.	Multimedia enhanced storybook reading intervention	1.No effect of the use of multimedia for non-EAL children, there was an effect for EAL children on researcher-designed measure and general measure of vocabulary 2. Multimedia-enhanced vocabulary intervention: gap between non-EAL and EAL children in knowledge of words targeted during intervention closed, and gap in general vocabulary knowledge narrowed. 3. Use of multimedia support did not negatively impact the achievement of the non-EAL children in terms of vocabulary
18	Uchikoshi, (2006).	Spanish	108	5-6 years	**Treatment 1:** Children watched ‘Arthur’ repeatedly in class, **Treatment 2:** Children watched ‘Between the Lions’ **Control:** Business as usual (no television viewing)	1 x 30 minute tv show 3x per week for a total of 54 episodes	Implicit vocabulary intervention through watching educational television programmes,	No effects of classroom viewing but those who watched shows at home had steeper growth trajectories than those who didn’t. Overall all three groups increased their vocabulary knowledge at about the same pace.
19	Nelson et al., (2011).	Spanish	Cohort 1 n = 117 Cohort 2 n = 93	5-6	**Treatment Group:** Root word vocabulary and decoding skills **Comparator Group:** Interactive Book Reading: Pictures, child-friendly definitions, and guiding	20 mins/day 5 days/week for six months	Explicit vocabulary teaching compared to interactive story reading.	The treatment had relatively large effects on learning of both taught words and word reading.
20	Vadasy, et al., (2013).	Spanish	140	6-7	Longitudinal follow up of 2011 paper	See above	See above	6 months post intervention treatment benefits were maintained on all three outcomes.

21	Vadasy & Sanders, (2015a).	'African language' Chinese French Khmer Korean Laotian Spanish Vietnamese Burmese Punjabi	69	5-7	**Definitions Only Condition** Definition of each difficult word given the first time it appeared in each story **Definitions-Plus Condition.** Definition given then a card is shown with target word Children pronounce word Children say letters aloud while looking card Children pronounce word again.	6x days 5-10 minutes with a tutor	Story reading with definitions of target words compared to story reading with definitions and additional support.	Significant positive benefits for all children. Definitions-Plus instruction resulted in higher gains compared with Definitions-Only in the spelling of target words.
22	Vadasy & Sanders. (2015b).	Spanish 'African' 'Asian' 'Other'	100	4-8	**Treatment 1: Explicit Vocabulary (EV)** Direct instruction that included: explanations of word meanings, practice decoding taught words, and scaffolded practice using taught words in sentences. **Treatment 2: Explicit Vocabulary with added spelling (EV-S)** As the EV condition but with added written spelling and pronunciations in teaching word meanings.	15 minutes per day, 4x days/week x14 weeks	Benefits of added attention to orthographic and phonological word features in an explicit supplemental vocabulary intervention	Both groups made significant gains in general vocabulary, word reading and spelling. Students receiving instruction with greater attention to the spoken and printed word forms made significantly greater gains in general vocabulary and word reading, and in taught-word spelling.
23	Vadasy et al. (2015).	Spanish 'African' 'Asian' 'Other'	324	5-6	**Treatment Group:** connections' group with explicit instruction in high frequency decodable root words **Comparator Group:** 'interactive book reading' group as control, taught same words in storybook context	30 minutes per day x 20 weeks	Explicit vocabulary instruction compared to interactive book reading	Explicit instruction most beneficial to children entering kindergarten with limited alphabet and decoding skills.

Appendix 3: Results of interventions included in systematic review

	Study	Statistical Analysis Used	Effect Size Reported?	Author's conclusions	Risk of Bias
1	August et al., (2016).	Repeated measures ANOVAs (time x condition). Within-subjects design. Children were split into three groups and all took part in extended and embedded instruction. Time *p* <.0001 Condition *p* <.0001 Time x Instructional Condition *p* <.0001	**Hedge's g** Extended instruction: **g = 1.7**; (large) Embedded instruction: **g = 0.57**; (medium) Effect of extended instruction gains over embedded instruction: **g = 0.71** (medium)	Extended vocabulary instruction and embedded vocabulary instruction effective in helping 8-10 year old EALs learn vocabulary, but extended instruction more effective. Academic science vocabulary taught using embedded instruction learned more successfully than general academic words. This was not the case for extended instruction, for which there were no significant differences in word learning by word type.	High
2	Baker et al., (2016).	ANOVA and ANCOVA (using pre-test scores on *Bilingual Verbal Ability Test* ' No significant differences found by condition (interventions vs commercially available 'business as usual' programmes')	Not reported	Commercially available interventions for at-risk monolingual students can be effective for EALs. No need was identified for English language ability prior to intervention, i.e. at risk EALs can receive explicit supplemental instruction as soon as they are screened and identified, without need to build up a baseline English language ability first.	Low
3	Carlo et al., (2004).	Multivariate ANOVA on six dependent measures. Significant gains over time, significant interaction between gains over time condition, and a three way interaction between gain over time, site and condition.	**η^2** Reading comprehension **0.08** (medium) Word association **0.05** (small) Polysemy **0.05** (small) Word mastery **0.34** (large)	Inferencing skills relating to newly encountered words could have ongoing value to children who encounter unknown words in semantically rich contexts. Findings reveal significant impact on reading comprehension	High
4	Cassady et al., (2018).	Multivariate ANOVA Kindergarten: Ns main effect of language proficiency or	**Partial η^2** **Kindergarten**	Computer Aided Instruction can be valuable if implemented by well trained teachers who use programmes to support children's literacy	Medium

		intervention use. N.S. interaction between language proficiency and intervention. First grade: Main effect of intervention (*p*<.01) ns main effect of language proficiency and interaction between language and intervention was also N.S. **ANOVA** Kindergarten: Significant interaction on EAL status and experimental condition on vocabulary subtest (*p*<.05). First grade: Intervention group has statistically greater gains in phonological awareness, (*p*<.01) phonics (*p*<.05) text comprehension (*p*<.01) and vocabulary (*p*<.01)	Growth on 'Reading Foundations' across both conditions from autumn to summer term **=.33** (large) EAL interaction effect of time x condition = .005 (NS) (small) Scantron Vocabulary subtest Language status x condition = **.016** (small) **First Grade** Growth on 'Reading Foundations' across both conditions from autumn to summer term **=.37** (large) EAL interaction effect of time x condition **= .014** (small) Scantron phonological awareness subtest **=.018** phonics **= .012** (small) text comprehension **= .021** (small) vocabulary **= .021** (small)	development. This study supports the CAI for EALs, where gains were made compared to the control group. The author's acknowledge that greater gains may have been made if L1 support was given, especially those with the lowest English proficiency.	
5	Castro et al., (2017).	Fitted models (no further details about what type of model) Significant results for language and literacy curriculum (*p* <.05)	**Cohen's d** **English** **Receptive vocabulary** ROWPVT **d=- 0.15** (small) RWKP **d= 0.19** (small) **Expressive vocabulary** PV **d =−0.03** (small/no effect) EWKP **d= 0.39** (small) **Phonological awareness** PAT **d= 0.20** (small) **Alphabet knowledge** LWI **d= 0.09** (small/no effect) **Writing** Write name **d= 0.17** (small) **Early mathematics** TEMA **d =0.14** (small) **Spanish** **Receptive vocabulary**	Positive intervention effects on quality of early childhood teacher practices, (especially EAL focused). Positive results for children's outcomes. EALs in treatment classrooms showed greater gains in expressive vocabulary in English than EALs in control classrooms, and, when assessed in Spanish, gains were higher in receptive vocabulary, alphabet knowledge, writing and early maths	Low

			ROWPVT-Bilingual **Expressive vocabulary d = 0.25** (small) **Phonological awareness d= 0.14** (small) **Alphabet knowledge d=−0.16** (small) **LWI d= 0.59** (medium) **Writing** **Write name d= 0.67** (medium) **Early mathematics** TEMA **d= 0.19** (small)		
6	Collins, (2010).	Hierarchical regression analyses Treatment group make the largest significant contribution to target word learning (*p* <.001) in the regression model.	**Cohen's d** Overall Treatment **d = 1.39** (large) Home reading frequency **d = 1.39** (large) L2 receptive score **d = 1.15** (large)	Rich explanation, L2 vocabulary, and frequent reading at home make significant contributions to EAL's English vocabulary acquisition from storybook reading.	Medium
7	Crevecoeur et al., (2014).	Three 2x2 ANOVAs were carried out (instruction condition x language status). **TWKM** Main effects for instructional condition, p < .001, and language status, *p* = .005 Interaction effect significant *p* = .034. **PPVT-III** Main effects for instructional condition p = .021; language status (*p*=.002) Interaction (condition x ls) = ns. **LCM** Main effect of instructional condition – ns.	**Cohen's d** TWKM (researcher developed vocabulary measure) ML group = **1.91** (large) EAL group =**1.08** (large) PPVT-III (Standardised measure) ML group **= 0.63** (medium) EAL group **= 0.29** (small) Post-test LCM ML group **= 0.61** (medium) EAL group **= –.05** (small/negligible)	Participants performed better if they were (a) in the treatment condition (b) categorized as an English only over EAL Treatment EALs and treatment MLs most likely perform equally well on post-test target-word and general receptive vocabulary measures if similar initial English general receptive vocabulary knowledge.	High

		Main effect of language status p = .007. No statistically significant interaction effect between instructional condition and language status for LCM p = .101			
8	Dalton, et al., (2011).	ANCOVAs used for pre-post-test gains with Tukey's post-hoc analysis Significant condition effect for researcher developed vocabulary measure, F(2, 103) = 17.40, p < .001, partial h2 = .272, along with interaction between condition and language status, F(2, 103) = 4.94, p = .001, partial h2 = .175. Tukey's post hoc showed strategy group's vocabulary performance significantly lower than combination group (t = –4.51, p < .001, partial h2 = .18) and vocabulary group (t = –3.28, p = .001, partial h2 = .15). Significant interactions existed within the strategy condition only, with the monolingual group outperforming the bilingual-Spanish group (t = 3.21, p = .002, partial h2 = .10).	**Partial η²** Researcher developed vocabulary measure (condition effect) **= .27** (large) Interaction between condition and language status **= .18** (large) Vocabulary score Comprehension strategy **= .18** (large) Vocabulary group **= .15** (large) Strategy condition monolinguals outperformed bilingual-Spanish group (.10) **(medium)**	Vocabulary and combination groups outperformed strategy group on ICON vocabulary test. EALs had difficulty developing vocabulary if it was indirectly addressed through reading comprehension strategies alone. Usual gap between ML and EAL disappeared in vocabulary and combination group- right type of scaffold levels the playing field for diverse learners	High
9	Giambo & McKinney (2004).	Pre-post test scores assessed using ANCOVA With oral English proficiency post-test scores as the DV and pretest scores as the covariate. Multiple regression analyses used to assess prediction of change in oral English proficiency No significant differences between group means on pre-test, but significantly differences in scores	**Cohen's d** Receptive vocabulary (PA Group) **= .74** (large) Receptive vocabulary (story reading group) **d = 0.59** (large)	The gain of both groups on oral English proficiency and vocabulary indicates that both interventions were educationally beneficial; however, the phonological awareness intervention was more beneficial than the story reading on oral English proficiency.	High

		on the receptive vocabulary measure from pre- to post-test for both groups. Higher effect size for PA group.			
10	Goodrich et al., (2013).	Regression analyses used (English only intervention vs control; transitional intervention condition vs control).	Not reported	Only a limited role for transfer of emergent literacy skills for Spanish-speaking EALs. Only certain skills transfer from one language to another. Support for the transfer of specific linguistic information (evidenced by moderation effect of initial vocabulary knowledge for both English-only and transitional intervention condition comparisons) and elision skills (for the transitional intervention condition comparisons) like a Matthew Effect.	Low
11	Lesaux et al,. (2010).	Hierarchical Linear Models with significant outcomes on target word mastery (*p*<.001), morphological composition (*p*<.001), and word meanings in context (*p* <.05)	**Cohen's d** Effect of knowledge of words taught **d= 0.39** (small) Morphological awareness **= .20** (small) Word meanings from expository text **= .20** Depth of word knowledge **= .15 (**small) Effect of norm referenced measure of reading comprehension **= .15** (small) Norm referenced measure of reading vocabulary **=.005** (small/no effect)	Significant intervention effects for researcher-developed vocabulary; knowledge of word meanings in context, and morphological skills. Standardised measure of reading comprehension had marginally significant treatment effects. The program did not show significant or practically meaningful effects on a standardised measure of reading vocabulary. Effects existed for MLs and EALs.	Low
12	Marshall & Hobsbaum, (2015)	ANOVAs with time vs condition. For receptive and expressive core vocabulary, and BPVS raw and standard scores for EAL children, there was a significant effect of	Not reported	Main effect was only found for time. SSE had no effect on how well children with EAL learnt English vocabulary: EAL pupils from the SSE school did not learn more words than EAL pupils at the comparison school.	High

		time (*p* <.001) but ns main effect of treatment, and ns interaction between time and treatment.			
13	O 'Brien, et al., (2014).	Ordinary Least Squares regression methods. **Vocabulary gains** Significant main effect of treatment. Significant main effect of pre-test vocabulary scores, children with lowest pre-test scores demonstrated higher vocabulary gains.	**R^2 regression means** Intervention Group Vocabulary growth **0.52** (large) Phonological awareness **0.18** (medium)	All children demonstrated substantial language and literacy growth, but children with the lowest pretest vocabulary knowledge achieved the greatest vocabulary gains. Findings suggest that an FLP emphasising authentic literacy practices holds particular promise in closing vocabulary gaps among children who enter early childhood classrooms with especially limited English vocabulary knowledge.	Medium
14	Pollard-Durodola et al., (2018).	Hierarchical Linear Models No statistically significant differences between the two intervention groups on standardised and researcher developed post-test measures of vocabulary.	**Cohens' d** Standardised vocabulary measures[1] PPVT 4- **-= -0.15** (small) EVT2 **= -0.03** (small) Researcher developed vocabulary measures Researcher-Developed Receptive Picture Vocabulary Test (RDRPVT) =**0.06** (small) Researcher-Developed Expressive Picture Vocabulary Test (RDEPVT) **= 0.13** (small)	Results did not support hypothesis that shared book-reading would yield higher outcomes on EALs' English vocabulary knowledge. Results from two standardized measures (PPVT-4, EVT-2) and researcher developed measures showed no statistically significant differences between EALs across conditions.	Low
15	Pollard-Durodola, et al., (2016).	Hierarchical Linear Models Significant effects of this intervention approach on proximal	**Cohen's d** Standardised vocabulary measures PPVT-4 **=- 0.07** (small)	EALs in initial stages of English language development in early years benefit from explicit instruction on content-related vocabulary concepts around science and social	Medium

[1] Effect sizes given for both conditions combined, as there was no significant difference between groups

		vocabulary outcomes with no significant effects on standardised vocabulary measures.	EVT-2 **=−0.04** (small) Researcher-developed measures: RDPRVT **= 1.34** (large) RDEPVT **= 0.88** (large) Overall difference between Treatment and Control **= 1.34** (large)	studies. May also profit from native language supports to facilitate second language learning.	
16	Proctor et al., (2011).	ANOVAs and Hierarchical Linear Modelling Large/significant effects on standardised measure of vocabulary knowledge and 2 researcher-developed measures. Non-significant effects shown for reading comprehension.	**Cohen's d** Vocabulary Breadth **= .84** (large) Vocabulary Depth (Definitions) = **1.26** (large) Vocabulary Depth (Picture) = 1.12 (large)	Completing more texts in ICON positively affected outcomes on depth of vocab test. ICON intervention did not benefit Spanish-English group at differential rate English group on standardised measures. Differences parallel. Language status differences absent on researcher-developed measures, levelling effect with respect to depth and breadth of intervention-level word knowledge	High
17	Silverman, & Hines, (2009).	ANCOVAs No effect of the multimedia condition for non-EAL children but there was an effect for EALs.	Knowledge of target words[2] Multimedia condition over the nonmultimedia condition for EALs was **0.97** Knowledge of general vocab Multimedia condition over the nonmultimedia condition for EALs was **0.99**	Augmenting well-established methods of vocabulary instruction through read-alouds with multimedia enhancements for EALs children may enhance/support their vocabulary learning.	Medium
18	Uchikoshi, (2006).	IGM- growth modelling analysis Growth modelling analysis revealed no effects of classroom viewing but those who watched shows at home had steeper growth trajectories than those who didn't.	Not reported	Classroom intervention effects not seen, home viewing a predictor of vocabulary growth. All three groups increased vocabulary knowledge at about the same pace. Could be due to no reinforcement after viewing. The findings of this study suggest importance of English exposure, as well as of native language	Medium

[2] The type of effect size calculated was not mentioned by the authors

				maintenance, for English L2 vocabulary development.	
19	Nelson, et al., (2011).	Multilevel Models Significant treatment effects on proximal reading vocabulary and word reading but not distal reading vocabulary.	**Cohen's d** Proximal measure of root word vocabulary Treatment outperformed controls **= 1.04** (large) Word reading Treatment outperformed controls **= 0.69** (medium) Distal measure of reading vocabulary Treatment students did not significantly outperform controls **= 0.38** (small)	The treatment had relatively large effects on learning of both taught word vocabulary and word reading. Large effect size found for word reading suggests advantage in linking vocabulary instruction with practice in phonics skills.	Low
20	Vadasy et al., (2013).	Multilevel Modelling Significant treatment effects were found across all outcomes	**Cohen's d** Treatment students scored higher than controls on proximal reading vocabulary (**=.23; small**) and distal (**=.29; small**) reading vocabulary as well as word reading (**=.35; small**).	6 months post intervention treatment benefits were maintained on all three outcomes. No evidence to suggest that early receptive vocabulary knowledge moderated longer term treatment effects. Results also showed that intervention 5-6 year old year gains in root word vocabulary uniquely predicted 6-7 year old distal vocabulary above and beyond kindergarten gains in distal vocabulary.	Low
21	Vadasy & Sanders, (2015a).	Multilevel Modelling Definitions-Plus intervention children benefitted over Definitions-Only on gains in target word vocabulary definitions ($p < .10$, $d = .41$), as well as a similar, albeit nonsignificant, pattern for target word receptive vocabulary gains ($p > .10$, $d = .30$).	**Cohen's d** Spelling of target words Definitions-Plus higher gains than Definitions-Only **=.57** (medium) Target word vocabulary definitions Definitions-Plus had higher gains than Definitions-Only **= .41** (small) Target word receptive vocabulary gains Definitions-Plus had higher	Significant positive benefits for all children. Definitions-Plus instruction resulted in higher gains compared with Definitions-Only in the spelling of target words.	Low

			but not significant gains than Definitions-Only **d= .30** (small)		
22	Vadasy, & Sanders. (2015b).	Fixed Effects modelling Significantly greater gains for EV-S children on. General vocabulary, general word reading, and spelling.	**Approximate effect sizes[3] (d*)** Significant treatment differences favouring the EV-S condition (pre-test post-test gains) general vocabulary, general word reading and taught word spelling d***** **=0.44, 0.39, & 0.47** N.S effects for general spelling or taught word reading vocabulary **d* = -0.04 and d = 0.21**	Both groups made significant gains in general vocabulary, word reading and spelling. Students receiving instruction with greater attention to the spoken and printed word forms made significantly greater gains in general vocabulary and word reading, and in taught-word spelling.	Low
23	Vadasy et al., (2015).	Intraclass Correlations and Fixed effects modelling Connections students significantly greater gains in reading vocabulary and decoding	**Cohen's d** significantly greater gains on vocabulary **= .64** (medium) and reading **=.45** (small) First grade follow up Gains greater for connections but with smaller effect sizes **= .29; .27** (small)	Children made significant growth in intervention specific reading vocabulary and decoding. Explicit instruction most beneficial to children starting schools with limited alphabet and decoding skills. .	Low

[3] According the author, the effect size *d** is assessed using twice the coefficient estimate divided by the square root of the sum of the variance estimates

Appendix 4: Example data extraction form

Name of person extracting data:	Emily Oxley
Date reviewed:	16/11/2017
PUBLICATION DETAILS	
Title/Author/Year	CREVECOEUR, Y. C., COYNE, M. D. & MCCOACH, D. B. 2014. English Language Learners and English-Only Learners' Response to Direct Vocabulary Instruction. Reading & Writing Quarterly, 30, 51-78.
Study funding sources	This research was supported in part by Project VITAL (Vocabulary Instruction Targeting At-risk Learners), R305G030250, U.S. Department of Education, Institute of Education Sciences.
Notes on the study **(including aim and study design)**	18-week vocabulary intervention study determining whether treatment outcomes had differential effects on EALs or MLs and whether the relationship between initial English general receptive vocabulary knowledge and response to vocabulary intervention differed by language status. The initial intervention study used a pretest, post-test, quasi-experimental group design with two instructional conditions (treatment/no-treatment).
Location	USA: 3x primary schools from NE USA
PARTICIPANTS	
Intervention	
Sample size	122 = whole sample; intervention condition = (EALs, n = 31; MLs, n = 49)
Sample age	Kindergarten
Sample sex	girls, n = 63; boys, n = 59 (whole sample) intervention condition EAL girls n= 15, boys n = 16 intervention condition monolingual girls = 28, boys n = 21
Ethnicity	All three schools served large concentrations of students from culturally/linguistically diverse backgrounds
L1	After English, Spanish was the language most often spoken at students' homes or was recognized as the dominant language in all three districts. 1x Farsi and 1x Haitian-Creole (whole sample)
S.E.S	Percentage receiving free/reduced price lunch (whole school) school A= 80.8 School B = 91.3 School C = 73.2
Inclusion criteria	Not reported
Any participants excluded?	*One student did not participate because of teacher recommendation, four participants moved out of the district, two participants were not administered post-test measures, and one participant's language status was not confirmed through school records.*

Method/s for recruitment of participants	Via schools
Setting	USA: Three urban elementary schools from three different school districts in the Northeast
Time it took to participate in the study	36 half hour readings/activities over 18 weeks
Description of Intervention	Children were taught the meanings of 54 target words (3 target words/book) from storybooks Storybook selection based on high-interest plots and rich, engaging language. The Project VITAL (Vocabulary Instruction Targeting At-risk Learners) research team selected storybooks and target words
Comparator group **No Treatment**	
Sample size	42 (25 monolingual; 17 EAL)
Sample age	66.76 months (monolingual) 66.06 months (EAL)
Sample sex	Not reported?
Ethnicity	As above
S.E.S	As above
Additional population description	As above
Setting	As above
Matched on	School, age
Inclusion criteria	As above
Any participants excluded?	Not reported
Description of Comparator	Business as usual
OUTCOMES:	
Outcome 1:	Target word knowledge measure
Details of measurement and analysis:	Researcher developed Untimed researcher-developed measure developed to assess participants' knowledge of target words at pre- and post-test. Research team selected a representative sample and assessed 37 of the 54 target words to reduce overall testing time. Participants asked to define an orally presented target word (e.g., "Tell me what the word stout means"). The second question presented the same target word in a

	neutral context (e.g., “What would a stout person be like?”). Responses for each question were scored as follows: (a) 0 for no knowledge, (b) 1 for partial knowledge, or (c) 2 for full knowledge. The internal consistency reliability for this measure was .98.
Outcome 2	Listening Comprehension Measure
Details of measurement and analysis:	The adapted Strong Narrative Assessment Procedure (SNAP; Strong, 1998) used to assess students’ listening comprehension at post-test. 18 target words that could be integrated into the 395-word SNAP story that were representative of the words taught throughout the intervention.
Outcome 3	General Receptive Vocabulary Knowledge Measure
Details of measurement and analysis:	The Peabody Picture Vocabulary Test–III (PPVT–III; Dunn & Dunn, 1997) measured participants’ general receptive vocabulary knowledge at pre- and post-test. Alternate forms of the PPVT–III were administered at pretest and post-test. No target words appeared on the PPVT–III.
RESULTS	
Summary of results:	**RQ 1:** First ANOVA examined (treatment or control group) vs language status (EAL or ML) on the TWKM Main effects for instructional condition, $F(1, 118) = 59.17$, $p < .001$, $d = 1.59$, and language status, $F(1, 118) = 8.26$, $p = .005$, $d = .71$, **were statistically significant**. **Interaction effect** between instructional condition and language status, $F(1, 118) = 4.60$, $p = .034$. Cohen’s d treatment effect in ML group = 1.91 Cohen’s d treatment effect in EAL group was 1.08. **Results suggest that intervention was more effective for native English speakers than it was for EALs**. Second ANOVA examined (treatment or control group) vs language status (EAL or ML) on post-test PPVT–III. The main effect for instructional condition was **statistically significant,** $F(1, 116) = 5.49$, $p = .021$, $d = .52$, with a medium effect size. The main effect of **language status** was **statistically significant**, $F(1, 116) = 10.05$, $p = .002$, $d = .68$, **medium effect size**. No interaction between instructional condition and language status, $F(1, 116) = 0.728$, $p = .395$, Cohen’s d for treatment effect was .63 in ML group and .29 in ELL group, **slightly stronger** treatment effect for the **ML** students. Third ANOVA examined (treatment or control group) vs (EAL or ML) on the post- test LCM. Main effect of instructional condition **not statistically significant**, $F(1, 115) = 2.03$, $p = .157$, $d = .38$. The main effect of language status **was statistically significant**, $F(1, 115) = 7.63$, $p = .007$, $d = .66$, **medium effect size**. No statistically significant interaction effect between instructional condition and language status for LCM, $F(1, 115) = 2.73$, $p = .101$

	Cohen's d effect size for treatment effect was .61 in ML group and –.05 in the EAL group, **slightly stronger treatment effect for the ML students**. Regression Analyses Hierarchical multiple regression analyses used to investigate whether pretest PPVT–III and language status explained statistically significant variance in dependent measures. INTERCORRELATIONS Cohen's (1992) index for significance of Pearson's product–moment r was to interpret magnitude of variable relationships. The intercorrelations between predictor variable centred pretest PPVT–III and dependent measures TWKM and post-test PPVT–III had **strong positive relationships**, suggesting participants' scores on pretest PPVT–III predict outcome scores on dependent measures. Intercorrelations between independent variable language status and dependent measures TWKM and post-test PPVT– III had **moderate negative relationships**, indicating language status was negatively related to outcomes on the TWKM and post-test PPVT–III. REGRESSION ANALYSES Regression analyses indicated treatment EALs and treatment MLs **most likely** perform equally well on post-test target-word and general receptive vocabulary measures if **similar initial English** general receptive vocabulary knowledge.
Authors' conclusions:	**Two major findings: (a) EALs and MLs responded similarly to direct vocabulary instruction after initial general English receptive vocabulary knowledge was controlled, and (b) EALs had significantly lower initial general receptive vocabulary knowledge compared to MLs.**
Future research suggestions	Rigorous experimental designs. Standardised process to determine language status pre-intervention. Distinguish type of EAL (e.g., bilingual vs. second language learners). Similarities and differences within and across language groups of participants should be investigated (e.g., Spanish speakers: Dominicans, Mexicans, Puerto Ricans, Spaniards, etc.). Consider using a researcher-developed target-word receptive measure to capture the sensitive nature of vocabulary knowledge. PPVT–III does not include EALs in its standardization sample, and therefore results of PPVT–III for EALs should be interpreted with caution. Measures that would have examined proficiency levels for both language development and expressive language would have complemented this study. Further investigation the listening comprehension skills of MLs and EALs.
Limitations:	The pretest, post-test, quasi-experimental group design of the present study was a limitation. A post hoc two-step process used to identify language status

	Although 98% of participants in the present study spoke Spanish, participants' and/or their parents' country of origin and within-group language similarities and differences were not investigated. Researcher-developed TWKM relied heavily on participants' expressive language skills, which may have under- represented their full knowledge of target words.

Appendix 5: Child questionnaire

<u>Child questionnaire</u>

(To be read aloud to the child and filled out by the researcher)

1. What language(s) can you speak other than English?

2. Can you read in that language?

3. Can you write in that language?

4a. Have you ever lived in another country? If yes, which one?

4b. If yes, did you go to school in that country?

5. What age (which school year) did you start at school (in England)?

6. Do you find it easier to speak in English or (other language)?

7. (If yes to 2) Do you find it easier to read in English or (other language)?

8. (If yes to 3) Do you find it easier to write in English or (other language)?

9. How often do you speak English at home?

a. Never b. sometimes c. most of the time d. all of the time

10. How often do you speak (other language) at home?

a. Never b. sometimes c. most of the time d. all of the time

11. What language/s do you speak, and who with?

	Only English	Mostly English, but sometimes [L1]	Both English and [L1] equally	Mostly [L1] but sometimes English	Only [L1]
Parents					
Brothers /Sisters					
Other family and friends					

Appendix 6: Word learning score sheet

Definition Knowledge

Novel word will play. Ask the child to name the animal and the description words.

Block A	**Animal**	**Adj 1**	**Adj 2**	**Adj 3**	**Total**
goni	fish O	sad O	blue O	red haired O	**/4**
salu	dog O	big O	brown O	dangerous O	**/4**
fybe	cat O	orange O	striped O	sleeping O	**/4**
Block B					
targeli	cow O	fat O	white O	spotted O	**/4**
pimut	bird O	old O	grey O	singing O	**/4**
mafyk	snake O	green O	dotted O	poisonous O	**/4**
Score					**/24**

Immediate Recall

A description will be read out. Ask the child to name the novel animal.

Block A	**Novel name**
Sad, blue, red-haired fish	goni O
Big, brown, dangerous dog	salu O
Orange, striped, sleeping cat	fybe O
Block B	
Fat, white, spotted cow	targeli O
Old, grey, singing bird	pimut O
Green, dotted, poisonous snake	mafyk O
Score	**/6**

Immediate Recognition

A novel word will be played aloud. Ask the child to point to the correct picture.

Block A	**Selection**
Fybe	Cat O
Goni	Fish O
Salu	Dog O
Block B	
Pimut	Bird O
Mafyk	Snake O
Targeli	Cow O
Score	**/6**

Delayed Recall

Read the description and ask the child to provide the novel name. Test Block A and Block B at the same time.

Block A	**Novel name**
Big, brown, dangerous dog	salu O
Orange, striped, sleeping cat	fybe O
Sad, blue, red-haired fish	goni O
Block B	
Old, grey, singing bird	pimut O
Fat, white, spotted cow	targeli O
Green, dotted, poisonous snake	mafyk O
Score	**/6**

Delayed Recognition

Read the novel word and ask the child to point to the correct picture- shuffle each time. Block A and Block B at the same time.

Block A	**Selection**
Fybe	Cat O
Salu	Dog O
Goni	Fish O
Block B	
Pimut	Bird O
Targeli	Cow O
Mafyk	Snake O
Score	**/6**

Appendix 7: Distractor stimuli for word learning task

Appendix 8: Stories

Talent Show on the Moon

Every night, Jack snuck out of his bedroom window, climbed into his rocket and blasted off into space! His favourite place to land was the moon to see his friends, the Mafyk, the Targeli and the Pimut. Most people think that the moon is just a big lump of rock, but all sorts of exciting things happened on the moon, and today was particularly exciting – it was the annual moon talent show. Jack was going to be the judge! Jack's rocket landed with a bump. He jumped out, took off his helmet, and shouted for his friends "Mafyk! Targeli! Pimut! Where are you? I hope you've practiced for the Talent Show!" There was no sign of the Mafyk or the Pimut, but Jack was sure to find them – the poisonous Mafyk was bright green and covered in dots and the old Pimut would surely be flying in the sky. But, Jack couldn't wait any longer, he bellowed "HURRY UP MAFYK! HURRY UP PIMUT! WE CAN'T BE LATE FOR THE TALENT SHOW!" so everyone could hear. In the distance, Jack heard the spotted, white Targeli mooing. The Targeli plodded over slowly, munching and licking his lips – "Good day Jack, you disturbed my snack time. You must try the grass on the moon! It's amazing!" The Targeli must have been eating lots and lots of grass, thought Jack, he was quite fat indeed!

Jack and the Targeli slowly plodded to where all of the moon animals were waiting to start the talent show. The grey Pimut was the first to fly up on to the stage. Using her beautiful voice, the Pimut chirped sweetly. Everyone cheered – the Pimut was the best at singing on the moon! Next on stage was the Mafyk. Using his long, slithering body, the Mafyk tied himself into a knot and then untied himself in 3 seconds. The Mafyk had beaten the moon record for untying knots!

The Targeli used his big appetite to chomp his way through 50 bags of grass in 10 seconds – beating yet another moon record! But oh no! Now the greedy Targeli was plodding towards the crowd – the Targeli was still hungry!! Luckily, a flock of Pimuts flew down towards the greedy Targeli and caught him with a huge net. Everyone cheered! The Pimuts flew back up into the sky to sing and the Mafyk waved its long, slithering body. Jack had to decide who the winner would be. But they were all so good.

He shouted to the crowd “Everyone was brilliant so I say you ALL win!!” They all cheered.

Jack knew it was time to go home. He put on his helmet and started the rocket engine. As he blasted off, he looked back and saw the Mafyk slithering after the rocket waving to him. Safely home, he snuggled under his covers. He thought about the Pimut’s voice, the Mafyk’s knots and the Targeli’s grass munching as he drifted off to sleep.

Lucy’s adventures at Hokey Pokey Monster Zoo

Animal Escape!

Lucy was very, very excited because today her dad was taking her to most wonderful place ever – The Hokey Pokey Monster Zoo. The Hokey Pokey Monster zoo does not have boring animals like monkeys, or lions, or tigers or even flamingos. Oh no! The Hokey Pokey Monster zoo has the most wonderful and bizarre animals from outer space planets and lands unheard of! Today, Lucy was hoping to see the gonis and the salus, and her favourite animal, the fybe. She loved its orange fur, and stripy back.

When they arrived at the zoo, Lucy was very excited to begin searching for animals and shouted “Where shall we go first?!” But before Dad could answer there was an announcement – “Don’t panic! The salu has escaped! Keep calm. I repeat: keep calm! We will catch him as soon as we can!” Oh no! The zoo keeper forgot to put the lock on the cage! Lucy decided to help! So, she ran around the zoo to look for the missing animal. She kept a look out for the big, brown salu. Dad shouted for Lucy to be careful, the salu was dangerous.

First Lucy ran past the gonis. She saw a sad goni with its blue scales and bright red hair, swimming around its tank. Then Lucy ran past the fybes. The purring fybes were fast asleep on a cosy cushion. Thank goodness these animals were safe in their cages, with the salu on the loose. But still, she could not find the missing salu! The zoo keepers were running around blowing through their whistles to try and catch him - if he heard the loud “PAROOOOOP” he was sure to come back. The zoo keepers looked for the missing animal next to the goni tanks. The gonis were swimming, but the missing animal wasn’t there. Then they looked by the fybe beds. The fybes were softly snoring, but there was no sign of the missing animal.

Then, Lucy had a truly brilliant idea! She decided to head back towards the tanks to try and find the goni because they were the salu’s favourite food! Uh oh! “Quick” thought Lucy, as she rushed back past the fybes who were still in their beds; “Quickity quick!” Almost there! Lucy stopped to take a look through her binoculars- and she saw the salu! The naughty animal was licking its lips at the sight of the goni. Thank goodness gonis can swim so fast! A zoo keeper threw Lucy the whistle and she blew through it just in time – it worked! As soon as the salu heard the whistle’s “PAROOOOOP” it came running back to its open cage and the zoo keeper locked the door! Everybody was relieved when the zookeeper announced that all the animals were safely back in their proper cages! What a busy day at the Hokey Pokey Monster Zoo! Lucy went to visit her favourite animal, the fybe. The fybe was still snoring on its bed, it had slept through the whole day! Lucy couldn’t wait to come back to the Hokey Pokey Monster Zoo another day!

Appendix 9: Picture for Story 1