The effects of English- vs first-language glosses to aid reading comprehension and vocabulary learning for EAL pupils

Madeline Noyes

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The effects of English- vs first-language glosses to aid reading comprehension and vocabulary learning for EAL pupils

Madeline Noyes

Supervisor: Hamish Chalmers

Kellogg College

Department of Education

University of Oxford

Abstract

Approximately twenty percent of pupils in the United Kingdom are exposed to a language other than English at home and are therefore classified as having English as an Additional Language, or EAL. There is unfortunately no national curriculum to support EAL pupils, and research on resources to support them is scant. Glosses have proven to be an effective resource for foreign language learners. A gloss is a note or concise definition provided with target words in a text to assist learners' reading comprehension (Lomicka, 1998). Substantial research in the field of second language acquisition has investigated the effects of first vs. second language glosses on reading comprehension and vocabulary learning. This research has mostly been done with adult foreign language learners, however, and only a handful of studies have used secondary school pupils as participants. There are important differences between foreign language learners and EAL learners which make this research only somewhat transferrable to EAL educational settings.

The current study sought to attend to this research gap by investigating different-language glosses and their effectiveness with EAL pupils in the UK. A parallel groups randomized trial intervention study (n=32 participants) was conducted to investigate the effectiveness of English- vs. first-language glosses to aid reading comprehension and vocabulary learning. Participants completed forms ahead of the intervention to provide demographic information, such as language background and prior knowledge of target words. They then completed the intervention across two sessions two weeks apart. During the first session, participants completed a reading containing five target words glossed in either their home language or English followed by reading comprehension and vocabulary post-tests. During the second session, participants were given the reading again without glosses and then completed the delayed post-tests.

The findings of the current study indicated no effect of gloss language on reading comprehension or vocabulary learning. Key areas for future research include replications of the current study as well as research on EAL pupils to address the drastic lack thereof. Despite very little research on the topic, these results provide promising evidence that the language to which EAL pupils are exposed does not impact the benefits of using glosses in the classroom. There is no difference between using a pupil's first language vs. English to develop glosses for class readings, which allows teachers to work with the resources available to them to best aid their pupils.

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EAL	English as an Additional Language
EFL	English as a Foreign Language
L1	first language
L2	second (or third, etc.) language
SLA	second language acquisition
UK	United Kingdom

Chapter 1: Introduction

1.1 The EAL context

As of January 2024, there are an estimated 1.7 million English as an Additional Language (EAL) pupils enrolled in schools in the United Kingdom (*EAL Education Policy in England - the Bell Foundation*, 2024). This means that almost 20% of the approximately 10 million pupils in the UK are classified as EAL (*Key UK Education Statistics - BESA*, 2021). In England specifically, it is estimated that the average student body consists of 40% EAL pupils in urban areas (Leung, 2010, p. 182). Despite the significant number of EAL pupils in schools throughout the UK, there is no national curriculum for EAL pupils (*EAL Education Policy in England - the Bell Foundation*, 2024). This means that it is the responsibility of individual schools to manage how best to support EAL pupils according to their unique needs. There is therefore a wide discrepancy in the support available to EAL pupils around the country; this is highly dependent on the volume of resources a school can dedicate to EAL support as well as the number of EAL pupils at any given school. Ultimately, support for EAL pupils is often underfunded and overlooked (*EAL Provision and Funding - the Bell Foundation*, 2023).

Considering there is no national EAL curriculum in the UK, it is especially important that research is being conducted on how best to support EAL pupils in the classroom. One such tool is the use of pupils' first languages (L1s), for example through teachers using the L1 themselves or through additional resources for students provided in the L1. Despite empirical evidence that the use of the L1 in the classroom is beneficial for second language acquisition (SLA) (de la Fuente & Goldberg, 2022; Littlewood & Yu, 2011; Macao, 2013; Salmona Madriñan, 2014) and ideology that supports L1 use in the classroom in guides on instructing EAL learners (Celic & Seltzer, 2012; Gibbons, 2009; Chumak-Horbatsch, 2012), this is often not reflected in actual school policy. Much like the lack of national policy on EAL curricula, EAL policy at the level of individual schools is also severely lacking (Forbes & Morea, 2024).

It is the hope that more robust research on how to support EAL learners can inform changes in policy. In the meantime, it is important for researchers and educators alike to better understand how different tools can be employed to support EAL pupils at school. One learning tool that has been extensively researched is glossing. A gloss is a note or concise definition provided to facilitate reading comprehension for L2 learners (Lomicka, 1998). Glosses are often used to aid the acquisition of target vocabulary and support readers' overall

ability to understand a text. There has been debate in the field regarding what language glosses should be presented in to be most effective for SLA: the L1 or the L2. As the current study focuses on EAL pupils, the majority of research cited and discussed in this dissertation focuses on L2 learners of English. Given the disconnect between research findings on L1 use in the classroom and actual educational practices, substantiating the effectiveness of different language glosses to aid reading comprehension and vocabulary learning may serve as an additional tool in normalizing the use of the L1 in the classroom.

Substantial research on the use of L1 vs. L2 glosses, specifically in the context of EAL learners, would help inform teachers on best practices to support their pupils in the classroom. The current study will aim to better understand this topic and make recommendations for future research and important pedagogical implications.

1.2 Aim of the dissertation

Considering the current state—or lack thereof—of EAL-specific curriculum in the UK in conjunction with the high proportion of EAL pupils in schools, the aim of this dissertation is to explore how tools can be used in the classroom to aid EAL pupils. The specific focus of this dissertation is on discerning whether English or L1 glosses are more helpful for EAL pupils in aiding reading comprehension and vocabulary learning.

The dissertation is structured as follows. First, a literature review is provided to give important context on this topic as well as to clarify the state of the research that has been conducted on L1 vs. L2 glossing to aid reading comprehension and vocabulary learning. The conclusions of the literature review inform the research questions and methodology of the current study. The following section of the dissertation presents the research questions that motivate the current study and the methodology employed to conduct it. Next, quantitative results are presented as they relate to each research question. Finally, the dissertation concludes with a discussion of the research findings, experimental limitations, and implications for practice, research, and theory.

Chapter 2: Literature Review

2.1 Introduction

This literature review will provide an overview of relevant theory and research on the use of L1 vs. English glosses to aid L2 English learners in the classroom, with considerations for how this can be applied to support EAL pupils in the United Kingdom. First, important definitions of key terms and concepts (e.g., EAL, glossing as a reading aid, gloss types) will be clarified. This chapter will then detail L1 use in the L2 and EAL classrooms and highlight how glosses can aid EAL learners. Next, two important theories, Kroll and Stewart (1994)'s Revised Hierarchical Model and Jiang (2000)'s psycholinguistic model of lexical representation, will be explored. An overview of the existing literature on L1 vs. L2 glosses will be provided with specific attention given to relevant studies focused on how glossing can aid reading comprehension and/or vocabulary learning. Several studies on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning conducted with school-aged learners will be addressed in detail. Gaps in the literature will be identified and recommendations for future research in this area will be addressed.

2.2 Language use in the classroom: different learner populations and reading aids

Roughly 20% of all pupils in the UK are considered to have English as an Additional Language (*Key UK Education Statistics - BESA*, 2021). To be classified as having EAL according to the UK Department of Education, a pupil needs to be reported as being exposed to a language other than English at home; once a pupil is enrolled in school as EAL this classification remains for the duration of their schooling. As this is quite a broad classification, there is significant variation among EAL pupils in schools. As no additional considerations are made in classifying pupils as EAL, there is virtually no difference between a child who has completed all of their schooling in the UK and a child who moved to the UK recently so long as they are exposed to a language other than English at home. It may seem obvious that there would be distinctions made in how to best support each of these two children—the child who recently moved to the UK would likely benefit from cultural and linguistic resources that the child who grew up in the UK may not require. This is also reflected in achievement statistics for EAL pupils in the UK. Overall, younger EAL pupils exhibit lower academic performance than their non-EAL peers but perform similarly by age

16 (Strand et al., 2015). This ignores the wide range in achievement for different groups of EAL pupils, however. Pupils with Lingala, Lithuanian, Portuguese, and Somali as an L1 often severely underperform compared to their non-EAL peers at age 16, whereas pupils with Russian and Spanish as an L1 may outperform their non-EAL peers (Strand et al., 2015). The needs of EAL pupils are unique and depend on each child's circumstances, and it is up to individual schools to determine the needs of each child considering the absence of a national EAL curriculum in the UK. Such curricula are also lacking at the school-level. A recent study assessed 998 secondary schools in England for their language policies, finding that only 63.3% of surveyed schools made any reference to language in their policies at all, and only about 15% (149 out of 998 schools) had policy related to EAL (Forbes & Morea, 2024). The responsibility therefore falls on teachers to determine how best to support their EAL pupils with little to no standardized guidance from their school administration or at the national level. What policy does exist for EAL pupils in the UK is severely lacking and under-researched, suggesting an urgent need for more cohesive and robust policy-based support for EAL pupils.

In addition to a lack of national policy for EAL pupils in the UK, there is also a lack of research. Murphy and Unthiah (2015) conducted a systematic review on intervention research that has been conducted with EAL children relating to their English language and literacy development. The researchers looked at studies published from 2000 onwards, and of the 29 studies they included in their systematic review, only one was conducted in the UK (Murphy & Unthiah, 2015, p. 7). The other 28 included studies were conducted in North America. While any research with EAL populations is beneficial, research done in the UK can better inform UK educational policy and practices than research conducted in other educational contexts, such as North America. The intervention study conducted in the UK, Kotler et al. (2001), focused on the development of oral skills and improved classroom interaction and is therefore not relevant to the current study, which focuses on literacy development. A more recent study sought to understand assessment procedures for EAL pupils, but this survey-based study also only focused on oral language skills as it focused on both EAL pupils and pre-schoolers (Oxley et al., 2019). The researchers sought to gain an understanding of current practices regarding the assessment of EAL pupils' oral skills and practitioners' attitudes toward current practices, comparing their findings with practices for monolingual children. Though a notable contribution to the field of EAL research in the UK, this study is also not entirely relevant to the current study besides demonstrating what has been done in the field in recent years.

Considering the lack of policy and research for EAL pupils in the UK, it is vital to investigate what research has been done to inform practices to support SLA more generally. Glosses are a well-researched tool that may be an invaluable resource for EAL pupils. There are several different types of glosses, such as marginal glosses (which appear in the margin of a text), definitional glosses (which provide basic definitions of words), contextualized glosses (glosses which provide the meanings of target words by using them in context), multiple choice glosses (where two definitions of a word are given and the reader must select the correct one) and hypertext glosses (clickable pop-ups in an online text). There has been extensive research conducted on various glossing types, and the literature suggests that glosses are overwhelmingly beneficial for L2 readers (Abraham, 2008; Arpaci, 2016; Barbadi et al., 2018; Cheng & Good, 2009; Choi, 2016; Ertuerk, 2016; Farvardin, 2012; Hu et al., 2014; Hulstijn et al., 2014; Kang et al, 2022; Kim & Choi, 2017; Ko, 2012; Kongtawee & Sappapan, 2018; Lee & Jeon, 2017; Madiba, 2010; Lomicka, 1998; Taylor, 2014; Yoshii, 2006; Yun, 2011).

Glosses can be presented in English or in pupils' L1s. In the SLA literature, glosses are most often a direct translation or explanation of target vocabulary in a text presented either between lines of the text or in the text's margins (Bowles, 2004; Choi, 2016; Ko, 2012; Larsen-Freeman & Long, 1991; Nation, 2001; Schmidt, 1993, 1994). As will be discussed later in this chapter, there is research to substantiate the benefit of using the L1 in the L2 classroom (de la Fuente & Goldberg, 2022; Littlewood & Yu, 2011; Macao, 2013; Salmona Madriñan, 2014). Such research indicates that it would be beneficial to encourage EAL pupils to use their L1(s) in the classroom, whether with classmates who share the same L1, in their note-taking, or even in completing assignments. It remains unclear, however, which glossing language is most advantageous to EAL pupils: English or their L1.

In most research published on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning, the L1 varies and the L2 is usually English (Kim et al., 2024). Though there is some glossing research on L2s other than English, the focus of the current study is on EAL learners, so the majority of research cited in this dissertation focuses on learners of L2 English. Most of the research that has been conducted on English vs. L1 glosses so far focuses on learners of English as a foreign language rather than English as an Additional Language, and the majority of studies utilize English language classes in countries where English is not the language of instruction for their participant population (Abraham, 2008; Al-Jabri, 2009; Barabadi et al., 2018; Cheng & Good, 2009; de la Fuente & Goldberg, 2022; Ertuerk, 2012; Farvardin & Biria, 2012; Hulstijn et al., 1996; Lee & Macaro, 2013).

Given that glossing has proven to be a helpful tool in aiding reading comprehension, it is important to determine which language (L1 or L2), if any, is most helpful to L2 learners.

L1 glosses may be a beneficial tool for EAL pupils that not only incorporates the use of their L1 but also helps them to keep pace with their monolingual English peers. On the other hand, it may also be the case that L2 English glosses are more beneficial to EAL pupils and developing L1 glosses may not be the most effective use of teacher time and resources. L1 glosses and English glosses may also be equally beneficial to EAL pupils, therefore indicating that glosses are helpful independent of glossing language. The subsequent sections of this chapter as well as the current study will attempt to better understand and investigate this topic, make recommendations for future research and pedagogical considerations.

2.3 Background: L1 use in EAL contexts

This section will provide a brief background on L1 use in the classroom. Most research has been conducted on L1 use in foreign language classrooms, but considerations will be provided for an EAL context.

It has long been debated whether the use of the L1 is advantageous to SLA (Almoayidi, 2018), with more recent research shifting almost entirely in support of using the L1 in the classroom; a recent systematic review concluded that L1-mediated instruction is vital for L2 success (Armstrong, 2023). Individual studies which have not substantiated this claim have also not found any detriment to the use of the L1 in the classroom (Chalmers, 2019). Despite decades of debate as to whether the L1 should be allowed in foreign language contexts, published research has overwhelmingly demonstrated that the L1 can be employed as an effective tool to aid SLA (de la Fuente & Goldberg, 2022; Lasagabaster, 2013; Littlewood & Yu, 2011; Salmona Madriñan, 2014). Lee and Macaro (2013) conducted a study to investigate L1 use in the L2 classroom across different ages and proficiency levels. They looked at the use of L1 Korean in the L2 English classroom for two groups of participants: primary school pupils who had only taken a few years of English and university students with far more advanced English proficiencies. Each subset of participants (primary school and university students) was split into two groups. One group was taught by bilingual teachers who translated key terms into Korean during a whole class reading session, and the other was taught by English monolinguals who used only English to gloss key words. Participants were then assessed on their knowledge of the key words using the Vocabulary Knowledge Rating

Scale. Results indicated that both age groups benefitted from the use of L1 Korean in the classroom and that primary school pupils benefitted even more than university students.

Given that there is research to substantiate the benefits of L1 use in the L2 classroom, it is likely that using pupils' L1s in class would also be helpful for EAL learners. There are, however, some important differences to consider between foreign language classrooms and classrooms with EAL pupils. An obvious but important difference between foreign language and EAL learners is that the entire school day functions as the L2 classroom for EAL pupils. The school curricula in countries where English is the primary language of communication, such as in the United Kingdom, Australia, and the United States, is overwhelmingly English-dominant. Further, unlike in many traditional foreign language classrooms, EAL pupils may be the only EAL learner in their class, or they may be one of many. There may also be many different L1s represented among EAL populations in schools. In the United Kingdom, teachers are often aware that their EAL pupils would benefit from additional support, but they lack the language knowledge, guidance, and resources to provide such support (Slaughter & Cross, 2021). L1 reading abilities are highly predictive of L2 reading abilities (Chuang et al., 2012), so it is important for educators to help EAL pupils develop and maintain their L1 abilities for the benefit of both the L1 and English. Developing these resources is becoming increasingly prevalent as the number of EAL pupils in the UK continues to increase.

It is also important to consider what kinds of resources are applicable to each school's EAL population, and how these may differ from resources used in schools to aid foreign language learning. For example, an interactive online platform implemented at a university in Chile was shown to be effective in facilitating L2 English acquisition for undergraduates when used in conjunction with in-person classes (Bañados, 2006). While it may seem like a great idea to provide EAL pupils with some sort of online English-learning platform, this may not be optimal if EAL pupils do not have designated 'EAL time' during the school day. Additionally, as was demonstrated by Bañados (2006), such online tools should be used in conjunction with in-person learning, and not as a replacement for it. For a school with a designated EAL space and large population of EAL pupils, however, implementing online learning tools may be a valuable resource.

It is vital to better understand what kinds of resources can best support EAL pupils so that appropriate tools can be developed and sufficient training provided to teachers. Glosses as resources to aid reading comprehension and vocabulary learning have already shown to be helpful for SLA. They could therefore serve as important tools to assist EAL learners with important vocabulary for class readings, for example. The current study seeks to better

understand what effect glossing language has on reading comprehension and vocabulary learning for EAL pupils, if any, and subsequent research should further investigate this, as well.

2.4 Theoretical overview: Kroll and Stewart (1994) and Jiang (2000)

It is important to delineate two important theories regarding L2 vocabulary learning. Both of the following models are primarily targeted at understanding adult SLA, or individuals who have matured past the critical period of language acquisition. Importantly, the exact age at which this maturation occurs is unclear (DeKeyser, 2000). This may affect how these models apply, for example, to secondary school pupils learning a new language.

The first model is the Revised Hierarchical Model proposed by Kroll and Stewart (1994). This model explains the relationship between the L1 and the L2 in storing lexical information (e.g. words and phrases) and conceptual representations in the mind. Kroll and Stewart depict this relationship on a continuum, where the model changes as a learner gains proficiency in their L2. As a beginner language learner, the L1 lexicon is significantly larger than the L2 lexicon. There is a conceptual link between concepts themselves and the L1 lexicon, and a lexical link between the L1 lexicon and the L2 lexicon in a learner's mind. As a learner gains proficiency in the L2, the L2 lexicon grows larger, and a conceptual link between the L2 lexicon and concepts themselves begins to form, growing stronger with increased proficiency. There is also a reciprocal lexical link that forms between the L1 and L2 lexica; lexical information passes bidirectionally, that is from the L1 to the L2 and from the L2 to the L1, rather than only from the L2 to the L1. A diagram of the Revised Hierarchical Model is included for clarity (figure 2.1).

Figure 2.1

This figure, taken directly from Kroll and Stewart's 1994 paper, depicts the conceptual and lexical links between the L1, L2, and concepts in the bilingual brain. As one initially acquires the L2, the strongest links exist between the L1 and concepts and from the L2 to the L1. Over time and as one develops higher proficiency in the L2, conceptual links between concepts and the L2 and lexical links from the L1 to the L2 develop, but they are weaker than those tied to the L1.

The Revised Hierarchical Model was proposed as an implication of findings from Kroll and Stewart (1994), where they investigated memory representations for bilinguals using translation and picture naming tasks. 24 Dutch-English bilingual undergraduates served as the experimental group and 16 native English speakers served as the control group. They completed a series of translation tasks (seeing a word in the L1 and needing to name it in the L2 or vice-versa) and picture naming tasks (seeing a picture and needing to name the item in the L2). Participants completed three blocks of the experiment; in one block all of the translation trials were presented and then all of the picture naming trials were presented, in one block all of the picture naming trials occurred before all of the translation trials, and in one block translation and picture naming trials were mixed and presented together in a random order. Results from this study showed that participants exhibited slower reaction times when all the translation trials and then all the picture naming trials occurred sequentially in comparison to when they were presented together in a random order. Participants performed the entire experiment quicker when the trial types were mixed. This was especially the case when translating from the L1 to the L2. These findings suggest that category interference occurs during the translation task, meaning that when all the translation trials occurred together, it made each individual trial more difficult due to the cognitive demands of the task. Kroll and Stewart supposed this is because the L1 lexical item first

activates the conceptual representation of that item, making it more effortful to retrieve the L2 lexical item. These findings led Kroll and Stewart to propose the Revised Hierarchical Model in the discussion of their publication, as they indicate that translating from the L1 to the L2 vs. from the L2 to the L1 engages different interlanguage connections.

In a follow-up publication, Stewart et al. (2010) updated the Revised Hierarchical Model in response to academic criticism thereof. Scholars in the field had questioned whether the model purely applied to visual word recognition, and if so, how this was related to cognition and not purely a visual task. Stewart et al. (2010) clarified that the Revised Hierarchical Model applies not only to visual word recognition but also to the underlying cognitive processes which connect lexical representations to their corresponding concepts. One important implication of the Revised Hierarchical Model is that vocabulary acquisition becomes more tied to conceptual links than the corresponding L1 lexical items as proficiency increases. This implication is also pertinent to the second important theory discussed in this section.

The second important theory for L2 vocabulary learning is the psycholinguistic model of lexical representation. Proposed by Jiang (2000), this model focuses on the cognition and lexical representations that underlie vocabulary acquisition. Jiang proposed three stages of vocabulary learning: the formal stage, the L1 lemma mediation stage, and the L2 integration stage. In the formal stage, learners encounter and establish the existence of a new lexical item (e.g. word) and its rules. In the L1 lemma mediation stage, the learner matches the new lexical item with its L1 equivalent. They are stored together and the L1 equivalent mediates the use of the L2 lexical item. Finally, in the L2 integration stage, the morphological, syntactic, and semantic characteristics of the L2 lexical item are integrated into its cognitive representation over the L1 lexical item. Jiang argues that, for many learners, L2 lexical items tend to stagnate in the L1 lemma mediation stage and never reach the third stage of this model. This results in L2 lexical representations being largely tied to their L1 counterparts and only weakly connected to the underlying concepts and poor integration of their morphological characteristics.

Both Kroll and Stewart (1994)'s Revised Hierarchical Model and Jiang (2000)'s psycholinguistic model of lexical representation have important potential implications for using L1 vs. L2 glosses to aid reading comprehension and vocabulary learning for EAL pupils. It may be that the L1 vs. the L2 is more beneficial for different kinds of EAL learners as a function of age, L1 literacy and overall proficiency, English ability, and year in school. For instance, older learners who have matured past the critical period of language learning

may perform better with L2 glosses, as this allows them to make more direct connections between L2 lexical items and the concepts that underlie them. Research discussed in the following sections will provide insight into how applicable these models are to these decisions. It will also inform what recommendations should be made regarding future research on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning.

2.5 The use of glosses to aid reading comprehension and vocabulary learning

There is demonstrable evidence to suggest that using glosses as a textual reading aid can help L2 English learners with reading comprehension and vocabulary learning skills (Chang & Good, 2009; Kim et al., 2024; Öztürk & Yorgancı, 2017). Different kinds of glosses appear to be similarly effective, with no apparent best format for glossing (Hulstijn et al., 1996). Yun (2011) conducted a systematic review to determine the effectiveness of hypertext glosses on language learning. In their analyses, they found that glossing is overall beneficial for language learning, though lower proficiency learners may benefit more from glossing than higher proficiency learners. Yun (2011) also found that lower proficiency learners gain the most benefit from multimodal glosses, for example by including both text and audio in a hypertext gloss. This finding also holds true as a function of glossing language. Some research has indicated that low proficiency learners may benefit more from L1 glosses whereas high proficiency learners perform better using L2 glosses (Hu et al., 2014; Miyasako, 2002). Ultimately, the existing literature on glosses in L2 learning contexts suggests that various types of glosses are helpful for those learning L2 English. What remains unclear is which language gloss is most helpful for learners.

A large body of research on foreign language learning has attempted to uncover whether L1 or L2 glosses are more advantageous for reading comprehension and vocabulary learning. Some research suggests that L1 glosses are more effective than L2 glosses (Al-Jabri, 2009; Erturk, 2016; Kim & Choi, 2017; Kim et al., 2024; Kongtawee & Sappapan, 2018). Other research suggests that there is no significant effect of glossing language, and that L1 and L2 glosses are comparably helpful to learners (Abraham, 2018; Arpaci, 2016; Barabadi et al., 2018; Kang et al., 2022; Ko, 2012; Lee & Jean, 2017; Yoshii, 2006). Almost no research suggests that L2 glosses are more effective than L1 glosses (Farvardin & Biria, 2012). Finally, some research has also suggested that L1 and L2 glosses are similarly effective in aiding reading comprehension but that L2 glosses are preferable for vocabulary

learning (Chang & Good, 2009). Further research indicated that, while L1 and L2 glosses similarly aid reading comprehension, long-term vocabulary retention may differ depending on gloss language, as lexical items are stored and remembered differently over time when paired with L1 vs. L2 glosses (Yoshii, 2006).

Choi (2016) conducted a study to investigate the effect of target word repetition on reading comprehension and vocabulary learning for L1 vs. L2 glosses. Participants consisted of 180 male tenth grade pupils in Korea learning L2 English. They were split into three groups: control / no gloss, L1 Korean gloss, L2 English gloss. Participants read a text where one subset of target words appeared two times and another subset of target words appeared four times throughout the text. They then completed immediate and delayed post-tests to gauge reading comprehension and vocabulary learning. Results indicated an effect of repetition, where L1 glosses were more effective for participant recall of words that had appeared four times, but L1 and L2 glosses were equally effective for words that had appeared only twice. Choi suggested that, by using L1 glosses, learners develop lexical representations of L2 words that are tightly linked to the L1 lexical system instead of the L2 lexical system. The findings of Choi (2016) provide support for Jiang (2000)'s psycholinguistic model on lexical representation as well as Kroll and Stewart (1994)'s Revised Hierarchical Model. Per the results of Choi (2016), additional repetitions of a target word with a corresponding L1 gloss may be more effective for short-term retention; however, this also results in a strengthening of the connection between the L1 and L2 lexical systems rather than between the L2 lexical system and the concept described by the target word. This therefore requires more long-term mediation between the L1 lexical system for retrieval of concepts in the L2 lexical system. The findings of Choi (2016) and their implications are also supported by Yoshii (2006).

It is difficult to navigate whether to use L1 or L2 glosses in a text. Ideally, learners will develop L2 lexical systems largely independent of the L1 lexical system during the L2 integration stage outlined by Jiang (2000). It is also important for learners to be able to understand the texts and target vocabulary given to them, and for lower proficiency learners L1 glosses may prove more immediately beneficial. This is especially relevant in the context of EAL learners. The most effective glossing language for EAL learners in a classroom may depend on the ultimate aims of using the glosses. In order to help EAL pupils keep better pace with their monolingual peers in school, it may be that the ideal glossing language is that which allows for better immediate understanding and vocabulary retention. More specific

research is needed to discern what is optimal for the EAL context: L1 glosses, L2 English glosses, or a combination of both.

2.6 Research on L1 vs. L2 glosses with secondary school pupils

Prior research on the use of L1 vs. L2 glosses for school-aged EAL pupils is scant. Most of the research on L1 vs. L2 glosses to aid reading comprehension and vocabulary learning focuses on university-level foreign language classes learning L2 English. Kim et al. (2024) published a systematic review on this topic, and of the twenty-six studies included in their analysis only five of them utilized high school-aged pupils as participants. Nineteen of the included studies utilized undergraduate students as participants, and an additional two of the studies worked with adult populations more generally. This highlights a gap in the literature on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning—there is little research to inform our understanding of school-aged populations. Pedagogical implications of research on glossing are likely to be extended to primary and secondary school contexts; it is therefore vital to conduct research with these populations to ensure that research findings and pedagogical recommendations are applicable to EAL learners of these age groups.

The following section will detail specific research that has been conducted with school-aged pupils on the efficacy of using L1 vs. L2 glosses to aid reading comprehension and vocabulary learning for L2 English learners (Arpaci, 2016; Choi, 2016; Hu et al., 2014; Kongtawee & Sappapan, 2018; Miyasako, 2002). All of these studies work with pupils in secondary school: ninth grade, tenth grade, or their final year of high school according to the authors' specifications of age and year in school. Emerging research with this age group provides a preliminary basis for addressing these research questions with school-aged populations, but there is still much more to investigate with learners from a wider range of ages and backgrounds.

Miyasako (2002) investigated the effects of several types of glosses on reading comprehension and incidental vocabulary learning. The study was conducted with 187 L1 Japanese L2 English high school seniors in Japan. There were four glossing conditions: L1 Japanese gloss, L2 English gloss, L1 Japanese multiple choice gloss, L2 English multiple choice gloss. Participants in the L1 English gloss and L2 Japanese gloss conditions saw a definitional gloss of each target word. Participants in the L1 English and L2 Japanese multiple choice gloss conditions, on the other hand, saw two definitional glosses of the target

word and had to select which was the correct one while reading. No control group (condition with no glosses) was used in this study. Miyasako stratified participants into high and low proficiency groups and randomly assigned each participant to one of the four gloss conditions while controlling for proficiency. Participants completed pre-task questionnaires on language background and demographic information before doing a reading under one of the four glossing conditions. This was followed by immediate reading comprehension and vocabulary post-tests and a delayed vocabulary post-test 18 days later.

Results of Miyasako (2002) indicated no effect of gloss type on reading comprehension. In regards to incidental vocabulary learning, the L2 multiple choice group performed best on the vocabulary post-test overall. Low proficiency learners in the L1 gloss and L1 multiple choice gloss conditions and high proficiency learners in the L2 gloss and L2 multiple choice gloss conditions scored best on the immediate vocabulary post-test. Results from the delayed post-test indicated poor retention of learned vocabulary across conditions. The findings of this study suggest that L1 glosses are more effective for low proficiency learners and that L2 glosses are more effective for high proficiency learners, a finding that has also been cited in research with adult learners (Ertürk, 2016). These findings support Kroll and Stewart (1994)'s Revised Hierarchical Model, which posits that lower proficiency learners' L2 lexical systems are more tied to and mediated by the L1 lexical system than higher proficiency learners. It is important to note that this study was published over 20 years ago. Its experimental design could be improved for more informative results (e.g. by adding a control group). Miyasako (2002) is still an important contribution to the field because it highlights the ongoing debate as to whether L1 or L2 glosses are more effective for L2 English learners as a function of proficiency, and because it works with a younger learner population—high school seniors—rather than undergraduate students.

Hu et al. (2014) is a more recent study conducted with high school-aged learners. The researchers were interested if L1 or L2 glosses would be more effective for reading comprehension and vocabulary learning and if learner proficiency (high vs. low) would affect these findings. The study was conducted with 78 English as a foreign language (EFL) ninth graders in Taiwan. Participants in the low and high proficiency groups were randomly allocated to one of two gloss conditions: L1 Chinese glosses or L2 English glosses. Hu et al. glossed five percent of the text and designed the reading task so that participants were presented the text on a computer and had to click on glossed words for the hypertext gloss to appear. Overall results indicated low vocabulary gains across glossing conditions. Low

proficiency learners in the L1 gloss group and high proficiency learners in the L2 gloss group performed best on the vocabulary post-test.

Hu et al. did not control for participants clicking on the hypertext glosses; there is no way to verify that participants actually used the glosses provided to them. The low gains in vocabulary may have been due to this aspect of their experimental design. It is difficult to make conclusions about the efficacy of these glosses at all, let alone which type was more effective, when it is uncertain whether participants used the glosses while reading. Hu et al. (2014) is a good example of a slightly more recent study with similar findings to those of Miyasako (2002), providing further support for an effect of proficiency on which gloss type is ideal for L2 English learners to aid reading comprehension and vocabulary learning. As with Miyasako (2002), there are weaknesses to the experimental design of Hu et al. (2014), as they also failed to include a control group in their experiment.

Another important consideration raised by Hu et al. (2014) is how researchers—and educators—count the words that pupils know. There has been significant debate in the field about how to best count lexical units for research and pedagogy purposes with no true consensus on which unit of measurement is best (Bauer & Nation, 1993; Brown et al., 2020; Brown et al., 2021; Dang, 2021; Gablasova & Brezina, 2021; Kremmel, 2021; Laufer, 2021; Laufer & Cobb, 2020; Nation, 2016; Nation, 2021; Webb, 2021). Hu et al. (2014) glossed five percent of the individual content words in the text in accordance with prior research stating that text intelligibility requires knowledge of approximately 95-98% of its vocabulary (Laufer, 1997; Nation, 2001; Read, 2000). Though the focus of this dissertation is not which lexical unit is employed to measure learner vocabulary knowledge, this is an important related issue in the field.

Another study, Arpaci (2016), improves upon the experimental designs of Miyasako (2002) and Hu et al. (2014) by including a control group in their study. Arpaci (2016) sought to better understand the effects of L1 vs. L2 glosses on reading comprehension and vocabulary learning as well as students' opinions on L1 vs. L2 glosses. Participants consisted of 81 tenth graders who had been taking English for six years and who were of elementary English proficiency. They were randomly assigned to one of three groups: no gloss (control), L1 Thai gloss, L2 English gloss. The study consisted of a vocabulary pre-test, reading a text with definitional (or no) glosses, and immediate and delayed reading comprehension and vocabulary post-tests. Interestingly, results indicated no difference between the two experimental groups (L1 vs. L2 glosses) for reading comprehension and vocabulary learning, and both groups outperformed the control group. There was an overall low rate of retention

on the delayed vocabulary post-test 15 days later. Qualitative interview data highlighted that pupils preferred glosses to no glosses and had a preference for L1 glosses over L2 glosses. These findings have been observed in subsequent research (Choi, 2016). The immediate post-test results may contradict the findings of Miyasako (2002), Hu et al. (2014), and Kroll and Stewart (1994)'s Revised Hierarchical Model, as lower proficiency learners would be expected to benefit more from L1 glosses, though no such benefit was observed in this study. Despite the lack of quantitative support for L1 over L2 glosses to aid lower proficiency learners, qualitative results reflect this via pupils' opinions.

Perhaps the most recent study conducted on this topic with school-aged learners is Kongtawee and Sappapan (2018), which investigated the effects of using L1 vs. L2 hypertext glosses on reading comprehension and vocabulary learning. This study was conducted with 83 low-achieving tenth graders in Thailand. Participants were randomly allocated to one of two conditions: L1 Thai glosses or L2 English glosses. The experimental procedure generally followed that of the aforementioned studies, wherein participants completed a vocabulary pre-test, a reading with L1 or L2 glosses, and then immediate and delayed reading comprehension and vocabulary post-tests. The authors did not specify the period between the immediate and delayed post-tests. Results indicated a benefit of L1 glosses over L2 glosses for both reading comprehension and vocabulary learning over time, which contradicts prior research which observed a steep rate of vocabulary attrition between the immediate and delayed post-tests (Arpaci, 2016; Miyasako, 2002). Interestingly, there was no control group in this study, even though prior studies, such as Arpaci (2016), had a similar number of participants and included a control group. Kongtawee and Sappapan (2018) do not highlight the lack of a control group as a limitation to their study, and they greatly support the use of L1 glosses in their discussion based on their experimental results. The lack of a control group is not an inherent design flaw, as it has been well-established in the literature that glosses are an advantageous tool in aiding reading comprehension and vocabulary learning. The authors' advocacy for the use of L1 glosses should be taken with some skepticism, though, as the research is not robust nor clear-cut enough to make such claims. Though previous research supports the claim that L1 glosses are more beneficial than L2 glosses for school-aged low proficiency learners (Hu et al., 2014; Miyasako, 2002), other research fails to support this claim (Arpaci, 2016). There is a significant need for higher quality research on this topic with younger learners.

Overall, research on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning for school-aged L2 English learners is lacking in the field. There are only

a handful of published studies which look at this learner population, and participants consist of entirely secondary school pupils in foreign language learning contexts. There does not seem to be any research on this topic conducted with EAL learners specifically, which is alarming considering the increasing number of EAL learners in UK schools. There also does not seem to be any research conducted on this topic with learners younger than ninth grade. This highlights another gap in the literature, as the most effective tools for secondary school pupils may differ from the most effective tools to aid primary school pupils. Additionally, the research that has been published with high school-aged populations lacks strong methodology. Studies often lack a control group (Hu et al., 2014; Kongtawee & Sappapan, 2018; Miyasako, 2002), and methodological details are missing, such as the period of time between immediate and delayed post-tests (Kongtawee & Sappapan, 2018) and the proficiency levels of participants (Choi, 2016; Kongtawee & Sappapan, 2018). These representational and methodological gaps in the literature lead to the current study, which seeks to address some of these issues by improving upon methodological gaps, working with EAL participants, and including even younger learners where possible.

Chapter 3: Methodology

3.1 Introduction

This chapter will detail the methods used in the present study. It was written in adherence to the CONSORT 2010 statement (Consolidated Standards of Reporting Trials, Schulz et al., 2010). First, the research questions will be presented and justified. Second, the design of the study will be stated. Next, participant recruiting methods will be described with specific attention given to the profiles of the schools which agreed to help recruit pupils for this study. The participant population will be described in detail, and relevant demographic information about participants' language backgrounds and English proficiency levels will be provided. The intervention will be detailed with an explanation of how the materials for the study were developed, and the outcome measures will be described. Next, an overview of how random allocation was implemented to assign participants to the two comparison groups will be presented. Data analysis methods will then be addressed. Finally, ethical considerations for the current study will be addressed.

3.2 Research questions

In evaluating prior research on glosses, it became evident that there are several gaps in the literature, as discussed in the previous chapter. The following research questions are motivated to address relevant gaps in the literature, such as the lack of prior research with school-aged participants or with EAL as opposed to EFL learners. These questions seek to better understand the use of L1 vs. English glosses to aid reading comprehension and vocabulary learning in the context of EAL pupils in the UK. Given the findings of the literature review, the questions that will be addressed in this project are as follows:

> Research Question 1: What are the differential effects of providing L1 glosses compared to English glosses on English reading comprehension?
>
> Research Question 2: What are the differential effects of providing L1 glosses compared to English glosses on productive vocabulary learning of English words?
>
> Research Question 3: What are the differential effects of providing L1 glosses compared to English glosses on receptive vocabulary learning of English words?

3.3 Design

The research adopted a parallel groups randomized trial design with participants allocated at the level of the individual at a 1:1 ratio.

3.4 Participant recruitment and characteristics of participating schools

Participants were primarily recruited through Jacari as well as by coordinating with individual schools themselves. Jacari is a charity that works with schools in Bristol and Oxford to provide additional support to EAL pupils from migration backgrounds (*Introducing Jacari*, n.d.). Eligible EAL pupils are usually recommended to join the Jacari program by their teachers. Jacari pairs participating EAL pupils with qualified volunteer tutors. Jacari contacted the schools they work with on my behalf to inquire whether they would be willing to recruit pupils to participate in the current study. Two interested schools reached out to me in response, and participant recruiting was conducted with these school populations.

School 1 is an Academy sponsor led Church of England controlled secondary school in Oxford, England. According to a recent government report, it has 1154 pupils and opened in the fall of 2020. 42.1% of pupils at School 1 are eligible for free school meals, and the most recent Ofsted report of the school, conducted in October 2023, concluded that School 1 requires improvement. A citation for this information is not provided as it compromises the school's anonymity. The after-school Jacari program normally has three pupils in attendance, however participants for the current study were recruited from the larger EAL population in the school via the EAL Intervention Coordinator. A significant portion of the EAL pupils at School 1 are from East Timor and speak Tetum as an L1. Interestingly, School 1 often uses Indonesian to aid these pupils due to the close geographical and political relationship between Indonesia and East Timor, as Tetum dictionaries and translations are difficult to obtain, and this method functions adequately for most pupils. For the current study, I used Indonesian translations with participants having L1 Tetum, as this mimics the school environment. A complete list of L1s spoken by the EAL pupils was not available to me, but the EAL coordinator shared the following list of L1s with me: Arabic, Bulgarian, Italian, Korean, Spanish, Portuguese, Tetum, and Turkish.

School 2 is an Academy sponsor led, non-selective, Church of England controlled secondary school in the city of Bristol, England. School 2 has 1176 total pupils and opened in 2008. 19.4% of pupils at School 2 are eligible for free school meals, and the most recent Ofsted report, conducted in November 2022, rated the school as good. A citation for this

information is not provided as it compromises the school's anonymity. There are 19 pupils enrolled in the Jacari program at School 2. There is a diverse set of L1s among the pupils who attend Jacari: Dari, Pashto, Punjabi, Russian, Tamil, Turkish, and Ukrainian. All of the pupils from School 2 who participated in the current study attend the Jacari program, which takes place on Friday mornings during the school day.

In addition, I worked with a third school independently. I was put in contact with the school's EAL coordinator to facilitate participant recruiting. School 3 is a non-selective, Roman Catholic secondary school in Oxford, England. School 3 has 655 total pupils and opened in January 2021. 29% of pupils at School 3 are eligible for free school meals, and the most recent Ofsted report, conducted in October 2023, rated School 3 as good. A citation for this information is not provided to preserve School 3's anonymity. School 3 does not currently work with Jacari, and the school population consists of a high proportion of EAL pupils.

An additional two participants were recruited via snowball sampling. These two participants were identified via a colleague in the Department of Education with contacts in the greater university and Oxford community. Once my colleague had heard from their contacts, they gave me the contact information of those who had consented to be contacted, and I reached out to those interested in participating in the study.

3.5 Participants

3.5.1 Recruiting participants

To be eligible for the current study, participants needed to be currently enrolled in primary or secondary school, classified as EAL, and have at least some level of proficiency in their L1, though the ability to read in the L1 was not a required criterion. To allow as many participants as possible to participate in the study, I kept eligibility requirements relatively liberal.

Once I had obtained approval to recruit participants from the headteachers, I worked with the EAL coordinator at each school to recruit participants. The EAL coordinator sent participant information sheets and consent forms (Appendix A) home to parents and pupils to be signed and returned ahead of the study. In the case of pupils aged 16 and over, opt-out forms (Appendix A) were sent home along with the information sheets. In the case of participants recruited via snowball sampling, the information sheet was given to the parent

and child, I verbally explained the study to them, and the consent form was signed upon arrival to partake in the study.

Before each of my school visits, the relevant EAL coordinator would tell me the number of pupils expected to be in attendance who had returned the consent form.

3.5.2 Participant information

32 children aged 9 to 16 years old took part in the study. Eleven of the participants attended School 1 in Oxford, seven attended School 2 in Bristol, twelve attended School 3 in Oxford, and two attended other schools in Oxford. The average participants' age was 13.7 years old, with 27 of them falling between 12 and 15 years old (figure 3.1).

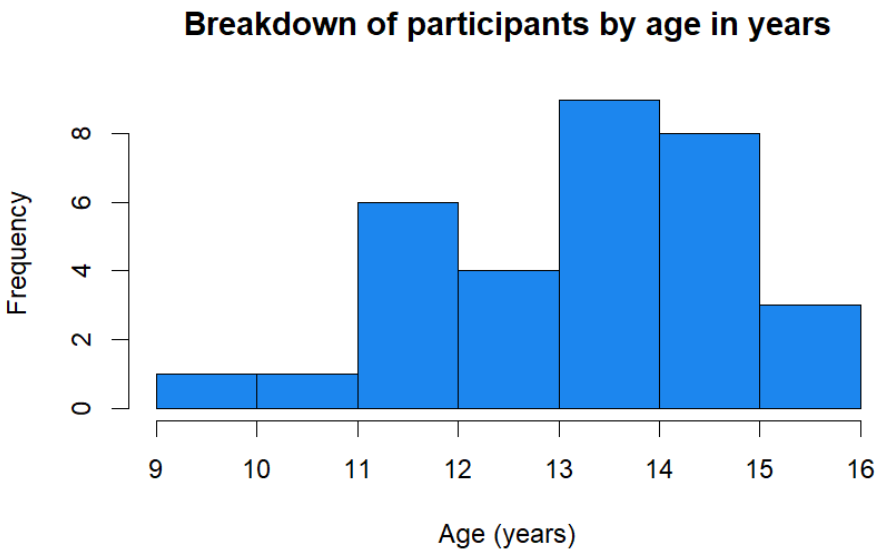


Figure 3.1 *Breakdown of participants by age in years*

3.5.3 Language Background Questionnaire and English Proficiency Measure

I developed both the Language Background Questionnaire and the English Proficiency Measure (Appendix B) with the intention of better understanding participants' experiences with their L1(s) and English both in and out of the classroom. I gave both forms to participants at the beginning of the first session before the intervention.

The Language Background Questionnaire asked participants what language(s) they spoke at home, how often they used their home language(s), if they could read in their home language(s) (yes or no), for how many years they had been learning English, and how many years old they were on their last birthday. There were also two questions about participants'

use of English using a four-point Likert scale regarding how often they used English and how well they could read in English. Ideally, pupils' answers to this form would have informed eligibility criteria for participation in the current study, for example by excluding participants with no L1 literacy or ensuring that all participants had been learning English for only a pre-determined amount of time. Due to recruiting difficulties and time constraints, this was not possible. I will consider potentially important individual differences between participants in the discussion section of this dissertation.

For the English Proficiency Measure, participants answered six questions that were based on a free set of practice questions for the Cambridge English Exam targeted for B1 learners of English (*Cambridge Assessment English*, n.d.). Ideally, I would have implemented this measure before the intervention and used it as a part of the eligibility criteria so that those participating in the study would have scored above 4 out of 6 on the measure. Due to difficulties with participant recruitment and time constraints, however, I used it as a check to see if participants were homogenous in their scores.

I supervised participants' completion of the Language Background Questionnaire and the English Proficiency Measure. Participants completed these as pencil-and-paper tasks without a time limit to complete them. I encouraged participants to work at their own pace and ask me any questions to ensure they understood the meaning of the questions, specifically for the Language Background Questionnaire.

3.5.4 Summary of findings from the Language Background Questionnaire and English Proficiency Measure

There were seventeen different L1s represented by this sample, with seven of the participants citing Ukrainian and/or Russian as their first language(s) and six participants citing Tetum as their first language (figure 3.2). All participants reported using their L1(s) daily, and 29 of the 32 participants reported being able to read in their L1(s). Participants had been learning English for an average of 3.95 years, with a range of 4 months to 11 years and a median of 3 years (figure 3.3). 23 of the participants rated that they used English 'often' or 'sometimes,' and most participants rated that they could 'understand the main idea' or 'understand the main idea and some details' when reading in English. Participants' average score on the English Proficiency Measure was 4.41 out of 6, with a mode of 4.75. In recruiting participants, the EAL coordinators at Schools 1, 2, and 3 sent information sheets and consent

forms to pupils they deemed intermediate, and parents contacted via snowball sampling were informed that the study was targeted at intermediate learners of English.

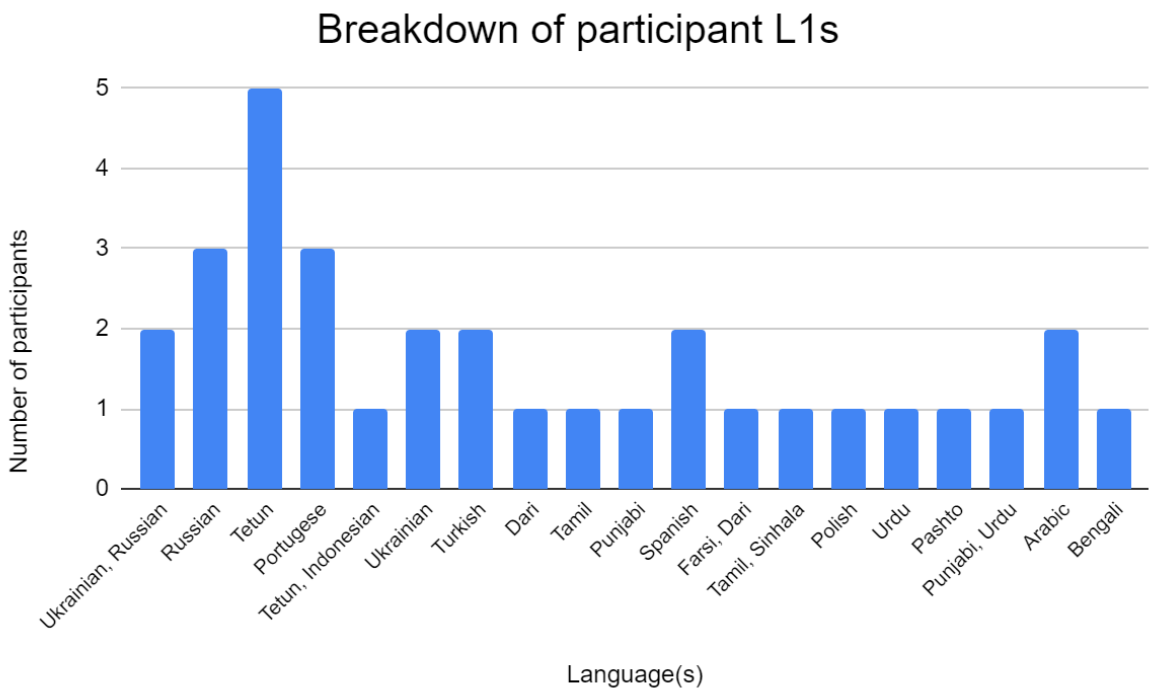


Figure 3.2 *Breakdown of participants by L1*

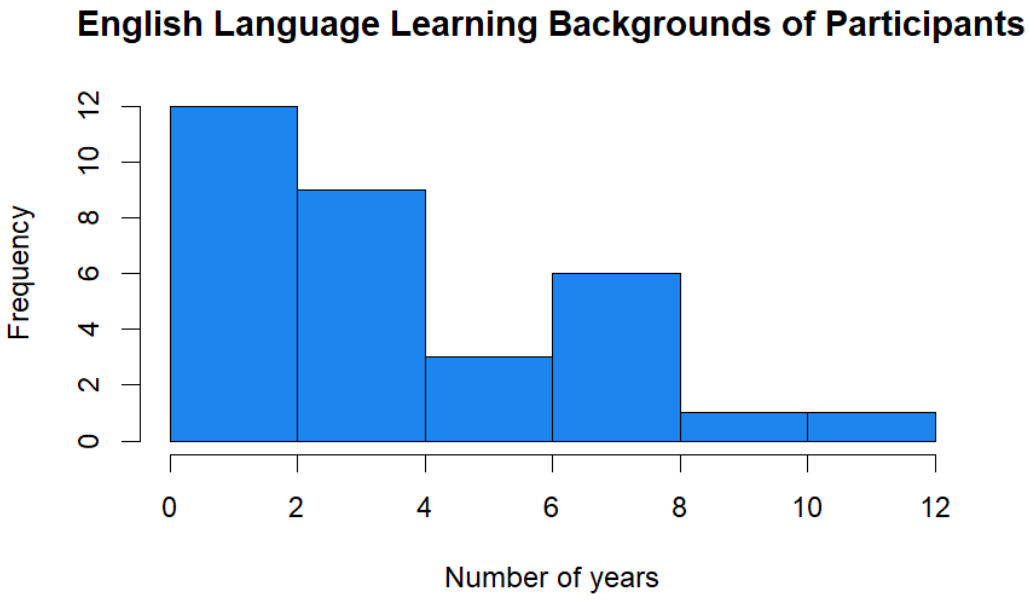
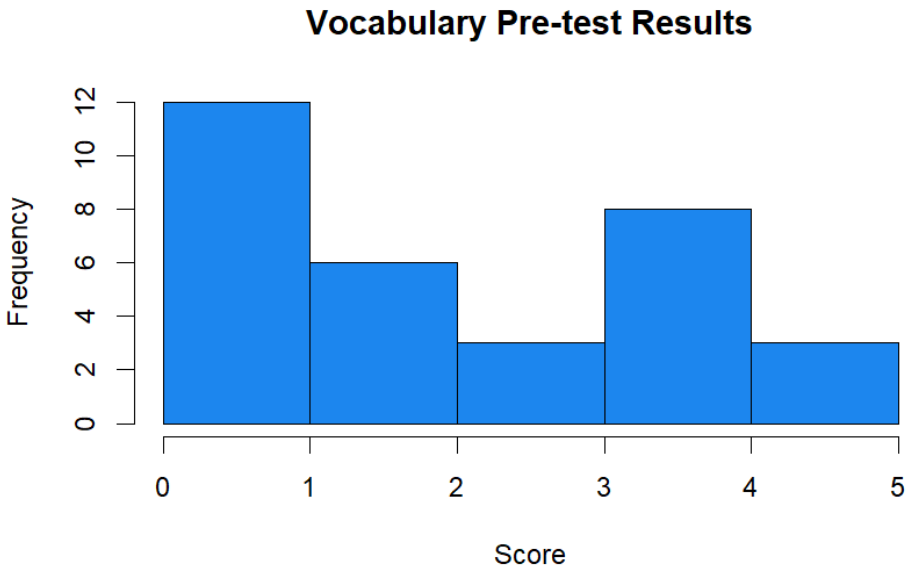


Figure 3.3 *Histogram showing how long participants had been learning English prior to completing the current study*

3.5.5 Vocabulary Pre-Test

After participants completed the Language Background Questionnaire and English Proficiency Measure, I gave them the Vocabulary Pre-Test (Appendix B). This multiple-choice task was meant to check whether participants already knew the target vocabulary before they completed the study. Participants were given unlimited time to complete the pre-test, and I answered any questions about the meaning of the questions (e.g. that participants were supposed to choose the option that corresponded to the meaning of the content word in the question). Ideally, the Vocabulary Pre-Test would have been completed ahead of the study as a part of eligibility criteria. If pupils already knew the five target vocabulary words, they would have been excluded from the current study. This was not possible due to time constraints for completing the study in one-to-two sessions. I still scored and analyzed the information from the Vocabulary Pre-Test to see if participants had prior knowledge of the target words. Participants scored on average 2.36 out of 5 on the Vocabulary Pre-Test, indicating that they knew half of the target words before participating in the study (figure 3.4).

Figure 3.4 *Vocabulary Pre-Test results*



The histogram depicts the distribution of pre-test results from all participants independent of experimental group. Scores are widely distributed, with a mean of 2.36 and median of 2. The majority of participants did not know all or most of the target vocabulary before completing the study.

3.6 Interventions

Participants completed the study over two sessions. These sessions took place during the school day, and I took participants out of their usual classes. For those in the snowball sampling group, I met with the participant and their parent at the Department of Education to complete the study. Each session lasted no more than thirty minutes, and participants completed all of the tasks individually. The first session consisted of filling out demographic forms and the intervention itself.

After the participants completed the pre-test, I gave them the main reading of the study with English glosses or L1 glosses (Appendix C) according to their allocated group. I encouraged participants to read at their own pace and to ask me any questions they had about the task, though I did not help them read or answer any questions about the meaning of words.

The text was 256 words in length (excluding glosses) and the topic of the reading was dinosaurs. I chose dinosaurs as the focus of the reading, because it is a topic which may be familiar to participants but is not included in the school curriculum. The text was generated using ChatGPT (OpenAI, 2024) using the following prompt:

generate a 250-word text about dinosaurs appropriate for a 12-year old's reading level including the words eradicate, enormous, extinction, fossils, threatening

The ChatGPT output was assessed for readability and modified so that each target word appeared in a different paragraph and to be at an appropriate level for participants. I edited the text to a Flesch-Kincaid score of 69, indicating that it was "fairly easy" to read and suitable for typical 12- to 14-year-olds with L1 English (Flesch, 2007). Five target words were included in bold in the text with corresponding glosses next to the text on the same page. The text consisted of 147 unique words. Including five target words meant that about 3% of the unique lexical items in the text were glossed. This corresponds with prior research on reading comprehension that indicates readers need knowledge of 95-98% of the vocabulary in a text in order to understand it (Laufer, 1997; Nation, 2001; Read, 2000). This was my rationale for including five target words and therefore glossing the most difficult three percent of the text.

The five target words were: eradicate, enormous, extinction, fossils, threatening. I chose these words because they are Tier 2 words and likely to be difficult and/or unknown to

participants (Kucan, 2012). They may not have officially encountered or explicitly learned these words before, but they are important academic words that are both applicable to dinosaurs and can be used more broadly. These five words also encompass multiple parts of speech. For participants in the L1 gloss group, I prepared glosses of all the possible languages of the participants in advance by asking the EAL coordinators at each school which L1s were represented among their pupils. For Arabic, Bulgarian, Italian, Korean, Polish, Portuguese, Spanish, Russian, and Ukrainian glosses, I translated from English using DeepL (*DeepL Translate: The World's Most Accurate Translator*, n.d.) and then sent the L1 glosses to a native speaker to be verified. For Bengali, Indonesian, Farsi, Punjabi, Sinhala, Tamil, Turkish, and Urdu glosses, I translated from English using Google Translate (*Google Translate*, n.d.) and then sent the L1 glosses to a native speaker to be verified. For Albanian, Dari, Pashto, and Somali glosses, I sent the English glosses to a native speaker of each language to translate from English.

The second session was much shorter and occurred two weeks after the first session. The purpose of the second session was to better understand participants' learning over time. I gave participants the reading again, but this time without glosses for the target words (Appendix C). I did not include glosses in any language with the text during the second session—my objective was to uncover whether there was an impact of gloss language in the first session on vocabulary learning over time. I encouraged the participants to read at their own pace for the second session, as well, and did not give a time limit for them to read the text. Participants could not ask questions about the meaning of the text.

3.7 Outcomes

The post-test included five multiple choice questions to gauge reading comprehension, five fill-in-the-blank style questions to test productive vocabulary learning, and five multiple choice questions to test receptive vocabulary learning of the target words (Appendix D).

After participants finished reading the text on dinosaurs, I took it away from them and gave them the post-test to complete. Participants could ask me about how to answer the post-test questions, but I did not help them actually answer any of them. Once participants finished the post-test, they were free to leave.

During the second session of the study, participants completed the delayed post-test (Appendix D). Once they finished reading the dinosaur text, I took it away and gave them the delayed post-test to complete. The delayed post-test consisted of the same ten questions from

the immediate post-test meant to gauge productive and receptive vocabulary learning. Once participants finished the delayed post-test, I explained the purpose of the study, allowed any follow-up questions, and then participants were free to leave.

3.8 Allocation to comparison conditions

Participants were stratified by group (School 1, School 2, School 3, snowball sampling) then allocated to a glossing language group (L1 or English) using a well-concealed, unbiased allocation schedule. Allocation was at the level of the individual. Participants were allocated to either the L1 or English gloss group in batches before each school session, as all pupils who returned their consent form participated in the study—no one was excluded before data collection was conducted.

A third party who was familiar with the project but who had no knowledge of the schools or participants involved performed the allocation. Furthermore, I had no knowledge of the demographic information of the participants prior to them completing the study, which added another layer of protection against conscious or unconscious bias in the allocation of participants.

Participants completed the Language Background Questionnaire and English Proficiency Measure in the same session as and immediately before the intervention. They had therefore already been allocated to groups beforehand. I gave the third party four sets of Participant IDs, one for each stratum of participants (School 1, School 2, School 3, snowball sampling). Participant IDs used no identifying information and consisted only of a letter unique to each group and then 001, 002, 003, etc. for the total number of participants in that stratum. The third party entered each set of Participant IDs into a random sequence generator to generate a randomly ordered list using random.org (Random.org, 1998-2024). I then split the list in half so that the first half of the list was allocated to the L1 gloss condition and the second half to the English gloss condition. Group allocation was concealed from participants and their teachers/parents until participants were given the reading activity in the first session. Characteristics following randomization are presented in table 3.5.

Table 3.5 *Participant characteristics after allocation to an experimental group*

		Experimental Group	
		L1	**English**
Number of Participants		16	16
Age in Years	9	0	1
	11	0	1
	12	4	2
	13	2	2
	14	6	3
	15	4	6
	16	0	1
Mean English Proficiency Score (SD) (out of 6)		4.55 (1.18)	4.28 (0.87)
Mean Number of Years Learning English		3.79 (2.70)	4.10 (3.00)
How often do you speak English?	Not at all	1	0
	sometimes	6	6
	often	6	5
	all the time	3	5
When you read in English, do you usually:	understand nothing	1	0
	understand the main idea	7	4
	understand the main idea and some details	6	6
	understand everything	2	6

3.9 Data analysis

To address Research Question 1 (RQ1), independent samples t-tests were conducted to compare mean scores on the reading comprehension post-tests for the L1 and English gloss groups. Mann-Whitney non-parametric tests were conducted to address RQ2 by comparing mean scores on the productive vocabulary learning questions for the immediate post-tests of the two experimental groups, and mean scores and standard deviations were calculated for each experimental group's delayed post-tests. The same method was used to address RQ3 using mean scores from the immediate and delayed post-test questions aimed at assessing receptive vocabulary learning.

3.10 Ethics

The current study was conducted in compliance with relevant ethical procedures and policies at the University of Oxford. Ethics approval was applied for and approved (Appendix A) before any participant recruiting occurred.

Chapter 4: Results

4.1 Introduction

The following section will detail the quantitative results of the current study. First, a summary will be provided of the research questions as well as methods for data analysis. Next, the three RQs will be addressed as three separate sections, with descriptive and inferential statistics provided for each RQ. Reading comprehension (RQ1), immediate and delayed productive vocabulary (RQ2), and immediate and delayed receptive vocabulary scores (RQ3) will be analyzed for any effects of glossing language (L1 vs. English) on post-test performance. Outliers and discrepancies in the data set will also be addressed. The last section of this chapter will detail the overall findings of the study.

4.2 Restatement of research questions and data analysis methods

The current study is motivated by three research questions:

> RQ1: What are the differential effects of providing L1 glosses compared to English glosses on English reading comprehension?
>
> RQ2: What are the differential effects of providing L1 glosses compared to English glosses on productive vocabulary learning of English words?
>
> RQ3: What are the differential effects of providing L1 glosses compared to English glosses on receptive vocabulary learning of English words?

The relative effectiveness of L1 vs. English glosses for reading comprehension (RQ1), productive vocabulary learning (RQ2), and receptive vocabulary learning (RQ3) was assessed by comparing mean scores on the respective post-test sections pertinent to each RQ for each glossing condition (L1 or English). Main effects were compared for RQ1 using independent samples t-tests when normal conditions for skewness and kurtosis were observed. Mann-Whitney tests (the non-parametric version of the t-test) were performed to analyze RQ2 and RQ3 outcomes as the data were not normally distributed.

All analyses were conducted using RStudio (Version 2024.04.2+764) on a Lenovo ThinkPad Yoga Gen 8 running Windows 11.

4.3 Data analysis: Research question 1

What are the differential effects of providing L1 glosses compared to English glosses on English reading comprehension?

4.3.1 Descriptive statistics of the post-test results

Results for each group on reading comprehension are presented in table 4.1. As shown, the L1 gloss group scored slightly higher than the English gloss group, on average. Scores were out of a total of 5.

Table 4.1 *Descriptive statistics for reading comprehension post-tests*

	Mean	**Standard Deviation**
English gloss condition (N=16)	3.25	1.24
L1 gloss condition (N=16)	3.31	1.63

4.3.2 Distribution

To determine if the outcome data were normally distributed, their skewness and kurtosis were calculated. Because of the small sample size of the current study (fewer than 50 participants), skewness and kurtosis values should be between -1 and 1 to assume normal distribution (Kim, 2013). Both the English and L1 gloss groups were within this range for reading comprehension outcomes, therefore they are assumed to be normally distributed. These values are presented in table 4.2.

Table 4.2 *Distribution of outcome measures for reading comprehension post-tests*

	Skewness	**Kurtosis**
English gloss condition	-0.06	-0.96
L1 gloss condition	-0.68	-0.83

4.3.3 Inferential Statistics

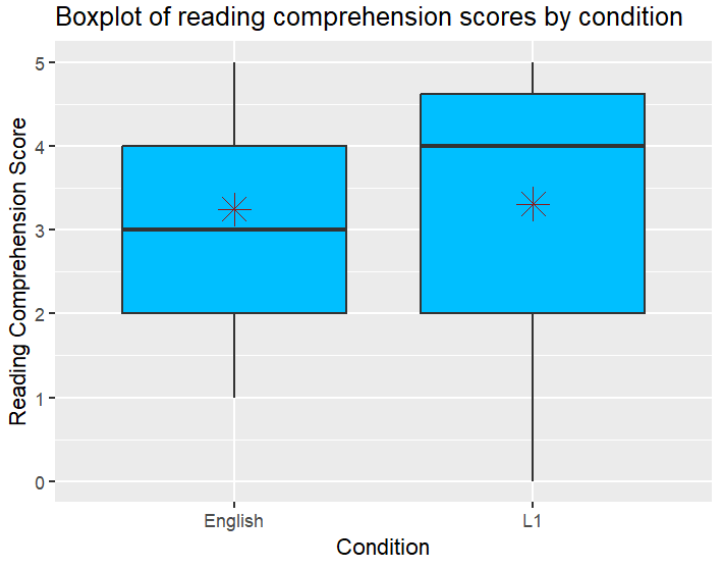
Independent samples t-tests were conducted to compare reading comprehension scores for the English and L1 gloss conditions. Alpha was set at 0.5.

No statistically significant differences in scores on the reading comprehension section of the post-test was detected between the English gloss condition (M=3.25, SD=1.24) and L1 gloss condition (M=3.31, SD=1.63); t(31)= -0.12, p=0.90 (table 4.3). These results suggest that the language in which glosses appeared did not affect participants' overall understanding of the text (figure 4.4).

Table 4.3 *Results of independent samples t-test for reading comprehension by condition*

Mean	Standard deviation	95% confidence interval		df	p-value
		minimum	maximum		
3.28	1.43	2.17	4.27	31	0.90

Figure 4.4 *Inferential statistics of reading comprehension outcomes for each experimental group*



The median is denoted with a black line and the mean with an asterisk for each condition. The area of the box depicts statistical spread via the interquartile range, or middle 50%, of each data set. The two black lines extending above and below each box represent the 1st and 4th quartiles to include all data points from each group.

4.4 Data analysis: Research question 2

What are the differential effects of providing L1 glosses compared to English glosses on productive vocabulary learning of English words?

4.4.1 Descriptive statistics

Immediate post-tests

Results for each group on productive vocabulary learning for the immediate post-test are presented in table 4.5. As can be seen, the L1 gloss group scored slightly higher than the English gloss group, on average, though there is a high degree of overlap in their standard deviations. Scores were out of a total of 5.

Table 4.5 *Descriptive statistics for productive vocabulary immediate post-tests*

	Mean	**Standard Deviation**
English gloss condition (N=16)	1.06	1.61
L1 gloss condition (N=16)	1.81	2.04

Delayed post-tests

Results for each group on productive vocabulary learning for the delayed post-test are presented in table 4.6. As is evident in the table, there was an extremely high rate of attrition from the immediate to delayed post-test. When considering how participants performed on the immediate vs. delayed post-tests, both groups scored higher on the delayed post-test for productive vocabulary, though the L1 gloss group still scored slightly higher than the English gloss group, on average. Due to the considerably high rate of attrition between the immediate and delayed post-test, delayed post-test results for productive vocabulary learning should be considered cautiously.

Table 4.6 *Descriptive statistics for productive vocabulary delayed post-tests*

	Mean	Standard Deviation
English gloss condition (N=4)	2.67	2.51
L1 gloss condition (N=4)	3.20	2.05

4.4.2 Distribution

To determine if the outcome data were normally distributed, their skewness and kurtosis were calculated. Because of the small sample size of the current study (fewer than 50 participants), skewness and kurtosis values should fall between -1 and 1 to assume a normal distribution (Kim, 2013).

Immediate post-test

Skewness and kurtosis values were calculated for the immediate post-test of productive vocabulary knowledge and are reported in table 4.7. Values were found to be outside of the accepted range of -1 to 1 for both the English and L1 gloss conditions. There were 7 participants who did not complete the productive vocabulary section of the immediate post-test (and therefore scored 0 out of 5 on the section), so skewness and kurtosis values were re-calculated when these participants were removed from the data set. 4 participants were removed from the English gloss condition and 3 from the L1 gloss condition. Removing these outliers did not change the outcomes, as skewness and kurtosis values still did not meet the requirements for a normal distribution. The non-parametric test was therefore adopted in conducting further analysis.

Table 4.7 *Skewness and kurtosis values for productive vocabulary outcomes on the immediate post-test for English and L1 gloss conditions*

	Skewness	Kurtosis
With entire data set ($N_{English}$=16, N_{L1}=16)		
English gloss condition	1.52	1.33
L1 gloss condition	0.45	-1.62
With outliers removed ($N_{English}$=12, N_{L1}=13)		
English gloss condition	1.12	0.12
L1 gloss condition	0.04	-1.80

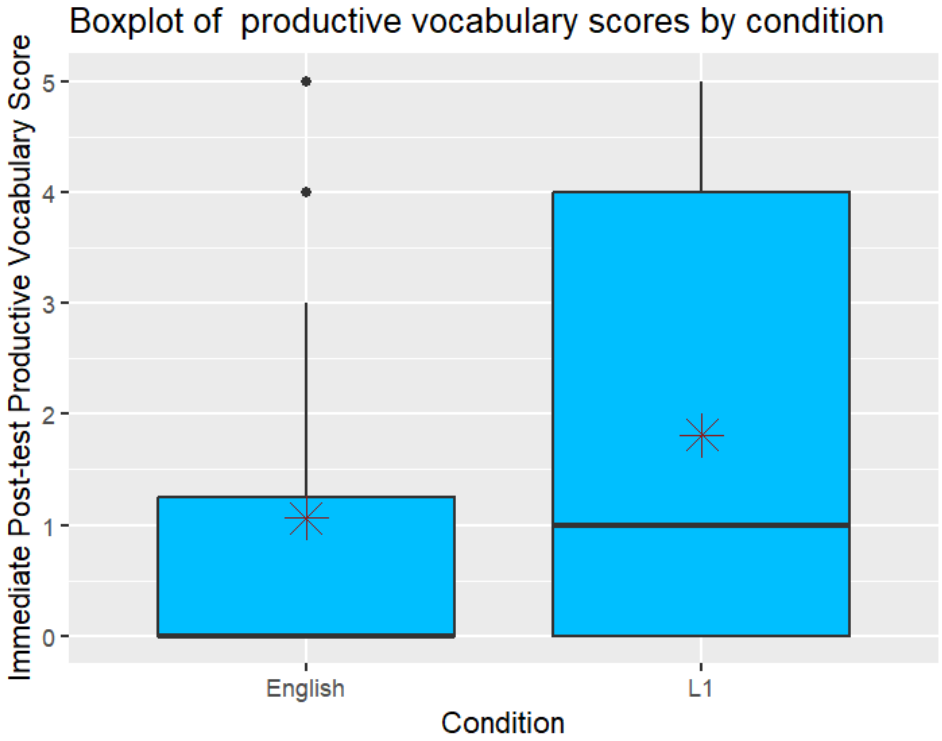
Delayed post-test

Skewness and kurtosis values were not calculated for outcomes for either the English or L1 gloss conditions because of the extremely low sample size (N=4 for both experimental groups). Therefore, additional inferential statistics were not calculated for the delayed post-test of productive vocabulary.

4.4.3 Inferential statistics

Because the standards for a normal distribution were not met, the Mann-Whitney non-parametric test was used for productive vocabulary outcomes on the immediate post-test for English and L1 gloss groups. Inferential statistics were calculated including all participants (n=32). No statistically significant differences in scores on the immediate post-test of productive vocabulary were detected between the English gloss condition (M=1.06, SD=1.61) and the L1 gloss condition (M=1.81, SD=2.04);
U ($N_{English} = 16, N_{L1} = 16$) = 107, z = -0.77, p = 0.44. These results suggest that the language in which glosses appeared did not affect participants' ability to recall target vocabulary (figure 4.8).

Figure 4.8 *Boxplot depicting productive vocabulary outcomes*



The median is denoted with a black line and the mean with an asterisk for each condition. The area of the box shows the interquartile range. The two individual data points in the English group are considered outliers, because they are more than two standard deviations different from the mean.

4.5 Data analysis: Research question 3

What are the differential effects of providing L1 glosses compared to English glosses on receptive vocabulary learning of English words?

4.5.1 Descriptive statistics

Immediate post-test

Results for the Vocabulary Pre-Test, immediate post-test, and delayed post-test of receptive vocabulary are reported together in table 4.9. As can be seen in the table, the English gloss group performed slightly worse than the L1 gloss group, on average. This performance difference can be seen in both the Vocabulary Pre-Test and the immediate post-test, indicating that both groups benefitted from the glosses, however the L1 gloss group scored slightly higher on average both before and after the intervention. The English gloss group's mean score improved by more than the L1 group's mean score, though their standard deviations overlap. Scores were a total out of 5.

Delayed post-test

As can be seen in table 4.9, both experimental groups scored similarly on the delayed post-test of receptive vocabulary. Both groups improved from their immediate post-test scores where the English gloss group had previously scored slightly worse than the L1 gloss group on the Vocabulary Pre-Test and immediate post-test. Given the extremely high rate of attrition between the immediate and delayed post-tests, delayed post-test results should be considered cautiously.

Table 4.9 *Descriptive values for the Vocabulary Pre-Test, immediate post-test, and delayed post-test of receptive vocabulary*

	Mean	**Standard Deviation**
Pre-test ($N_{English}$=16, N_{L1}=16)		
English gloss condition	2.06	1.65
L1 gloss condition	2.66	1.54
Immediate post-test ($N_{English}$=16, N_{L1}=16)		
English gloss condition	2.81	1.51
L1 gloss condition	3.06	1.60
Delayed post-test ($N_{English}$=4, N_{L1}=4)		
English gloss condition	3.67	2.31
L1 gloss condition	3.60	1.52

4.5.2 Distribution

As was the case for RQ2, skewness and kurtosis values were only calculated for the immediate post-test. Due to the stark rate of attrition between the immediate and delayed-post tests, delayed receptive vocabulary outcomes were not tested for a normal distribution. Because these values were not calculated for delayed post-test outcomes, inferential statistics were also not calculated.

Skewness and kurtosis values were calculated for the English and L1 gloss conditions for the immediate post-test of receptive vocabulary, and these values were found to be outside of the accepted range of -1 to 1 for both conditions. These values are reported in table 4.10.

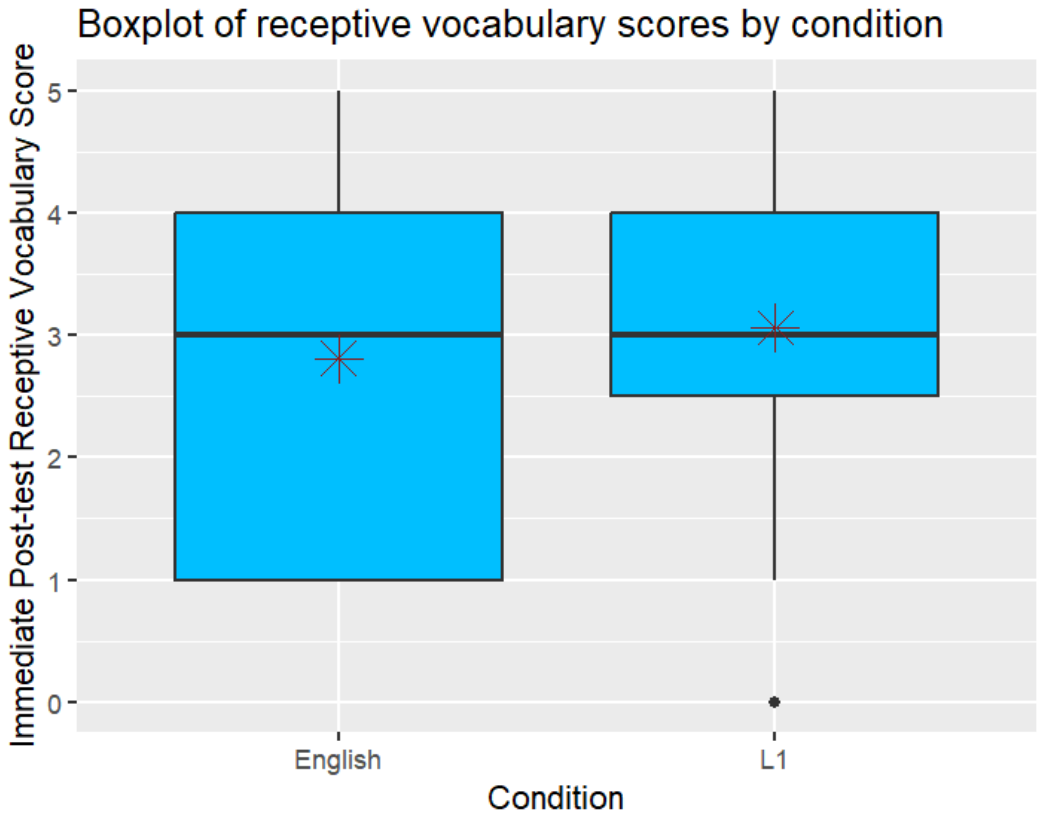
Table 4.10 *Skewness and kurtosis values for receptive vocabulary outcomes for the English and L1 gloss conditions*

	Skewness	**Kurtosis**
English gloss group (N=16)	0.10	-1.31
L1 gloss group (N=16)	-0.59	-0.63

4.5.3 Inferential statistics

Because the standards for a normal distribution were not met, a Mann-Whitney non-parametric test was used for receptive vocabulary outcomes on the immediate post-test for the English and L1 gloss conditions. No statistically significant differences in scores on the immediate post-test of receptive vocabulary were detected between the English gloss condition (M=2.81, SD=1.51) and the L1 gloss condition (M=3.06, SD=1.60); U ($N_{English} = 16, N_{L1} = 16$) = 114, z = -0.49, p = 0.62. These results suggest that the language in which glosses appeared did not affect participants' ability to recognize target words from the text (figure 4.11).

Figure 4.11 *Boxplot depicting receptive vocabulary outcomes*



The median is denoted with a black line and the mean with an asterisk for each condition. The area of the box depicts the interquartile range. The individual data point in the L1 group is considered to be an outlier.

4.6 Summary of findings

These results suggest that glossing language, or the language in which glosses appeared to participants, did not have an effect on participants' overall understanding of the text, recall of the target vocabulary, or recognition of the target vocabulary. Participants performed equally as well in the English gloss condition as in the L1 gloss condition.

Chapter 5: Discussion

5.1 Introduction

This chapter will review the context and aims of the current study. Findings will be presented and discussed. Implications of these findings will be discussed in the context of future research, practice, and theory. Finally, limitations of the current study will be addressed, especially as they relate to interpreting the findings of or replicating this study.

5.2 Context and aim: revisited

The primary motivation for this study was to address the gap in the literature pertaining to understanding what resources are most effective in aiding EAL learners. There is an abundance of literature on (adult) foreign language learners, but the research is lacking regarding EAL pupils, particularly in the United Kingdom, though this is true for other English-speaking countries as well. Given the lack of a dedicated curriculum for EAL pupils in the British system, the responsibility therefore falls on individual schools to determine how to best support EAL pupils without nationalized resources or guidelines. Because of this, the experience of EAL pupils in schools depends on what resources are available at their schools and the number of pupils sharing those resources.

Pertinent theoretical frameworks to EAL learners include Kroll and Stewart (1994)'s Revised Hierarchical Model and Jiang (2000)'s psycholinguistic model of lexical representation. Kroll and Stewart (1994)'s Revised Hierarchical Model details how the cognitive associations between L1 lexical representations, L2 lexical representations, and cognitive representations change over time, where the L1 lexicon is an early-on mediator of L2 lexical items and their conceptual representations. The L2 lexicon develops stronger links with conceptual representations with increased proficiency, and a bidirectional relationship develops between the L1 and L2 lexica (figure 2.1). Jiang (2000)'s psycholinguistic model of lexical representation consists of three stages: the formal stage, the L1 lemma mediation stage, and the L2 integration stage. According to Jiang, many second language learners remain in the L1 lemma mediation stage, thereby continuing to mediate L2 vocabulary via the L1 lexicon rather than developing a separate L2 lexicon. These models indicate that proficiency is a significant factor in determining what tools are most helpful for learners. In the context of developing resources for EAL pupils, it is then important to consider factors

such as overall L1 proficiency, L1 literacy, and English abilities in making recommendations for pupils.

Especially considering that there is no national EAL curriculum in the UK, it is important to research what resources can help EAL pupils. Glosses are a widely supported tool in SLA research that can be used to aid reading comprehension and vocabulary learning. The current state of the literature remains inconclusive as to whether L1 or L2 glosses are more helpful for foreign language learners, though some research indicates no effect of glossing language on the effectiveness of glosses (Abraham, 2018; Arpaci, 2016; Barabadi et al., 2018; Kang et al., 2022; Ko, 2012; Lee & Jean, 2017; Yoshii, 2006). The vast majority of research on this topic has been conducted with undergraduates (Al-Jabri, 2009; Barabadi et al., 2018; Cheng & Good, 2009; Ertuerk, 2016; Farvardin & Biria, 2012; Hulstijn et al., 1996; Lee & Jeon, 2017; Lomicka, 1998; Madiba, 2010; Öztürk & Yorganci, 2017). A smaller portion of the literature has used secondary school pupils as participants (Arpaci, 2016; Choi, 2016; Hu et al., 2014; Kongtawee & Sappapan, 2018; Miyasako, 2002). Very little—if any—research has been conducted on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning with EAL pupils. For such a well-established tool as glossing, it is surprising that there is no existing empirical work on their potential to aid EAL pupils. The state of the existing literature on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning led to the current study, which aimed to introduce EAL learners as a population of focus for this topic.

5.3 Findings for the intervention study

5.3.1 Findings for RQ1

What are the differential effects of providing L1 glosses compared to English glosses on English reading comprehension?

The current study did not detect any statistically significant differences in reading comprehension scores between conditions. Regardless of glossing language paired with the text (English vs. L1), average attainment was statistically indistinguishable ($p = 0.90$). This suggests that the language in which the glosses were provided did not materially affect how well students understood the text.

5.3.2 Findings for RQ2

What are the differential effects of providing L1 glosses compared to English glosses on productive vocabulary learning of English words?

The current study did not detect any statistically significant differences in productive vocabulary scores between conditions on the immediate or delayed post-test. Regardless of glossing language paired with the text (English vs. L1), average attainment on the immediate post-test was statistically indistinguishable ($p = 0.44$ for the immediate post-test results).

Due to the high rate of attrition from session 1 to session 2, insufficient data was collected to be able to run significance tests for the delayed post-test for productive vocabulary learning. Of the participants who completed the delayed post-tests, the means and standard deviations of each group overlapped significantly, indicating no difference between groups even with such a limited sample. Improvement in mean scores overall and for each group was observed from session 1 to session 2, but these results must be considered with extreme caution given the aforementioned high rate of attrition. These findings suggest that the language in which the glosses were provided did not materially affect participants' subsequent productive knowledge of the five target words at any time point (immediately after seeing the text with glosses or two weeks later).

5.3.3 Findings for RQ3

What are the differential effects of providing L1 glosses compared to English glosses on receptive vocabulary learning of English words?

The current study did not detect any statistically significant differences in receptive vocabulary knowledge between conditions on the immediate or delayed post-test. Regardless of glossing language paired with the text (English vs. L1), average attainment on the immediate post-test was statistically indistinguishable ($p = 0.62$ for the immediate post-test results).

Due to the high rate of attrition from session 1 to session 2, insufficient data was collected to be able to run significance tests for the delayed post-test. Of the participants who completed the delayed post-tests, the means and standard deviations of each condition overlapped significantly, indicating no difference between groups even with such a limited sample. These findings suggest that the language in which glosses were provided did not materially affect participants' subsequent receptive knowledge of the five target words at any time point (immediately after seeing the text with glosses or two weeks later). Trends in the

data indicated that the L1 gloss group performed slightly better than the English gloss group on both the pre-test and post-tests, though this difference did not reach statistical significance, and both groups improved by a similar amount from the Vocabulary Pre-Test to the immediate post-test.

5.3.4 Overall findings

No statistically significant results were reported in the current study. This suggests that the language in which glosses were provided to participants did not materially affect their understanding of the text or overall learning of the five target words. These findings with EAL pupils are supported by prior research that indicated no effect of glossing language on reading comprehension and/or vocabulary learning for foreign language learners (Abraham, 2018; Arpaci, 2016; Barabadi et al., 2018; Kang et al., 2022; Ko, 2012; Lee & Jean, 2017; Yoshii, 2006). Trends in the data showed that the L1 gloss group performed somewhat better than the English gloss group in terms of mean post-test scores for all measures, but these differences lack statistical significance. The lack of statistically significant findings in the current study may be due to its low overall number of participants and therefore low statistical power. The lack of statistically significant findings may also be because there is indeed no differential effect of English vs. L1 glosses to aid reading comprehension and vocabulary learning for EAL pupils.

5.4 Implications for practice, research, and theory

There are important implications to extrapolate from the findings of the current study. These implications pertain to educational practices in classrooms and schools with EAL pupils, future research that will build off of the current study, and theoretical frameworks that may need to be adjusted to accommodate school-aged populations and, more specifically, EAL pupils.

5.4.1 Practice

The findings of the current study have several key implications for pedagogical practices. If English and L1 glosses are equally beneficial to EAL learners overall, it may be up to teachers'—and students'—personal preferences to decide which glossing language(s) should be used in the classroom. For teachers that are already struggling to support their EAL pupils, developing L1 glosses may not be the most beneficial allocation of their time and energy.

They could instead put this effort toward developing and/or preparing more helpful resources for their EAL pupils. If teachers have L1 glosses readily available to them to use in the classroom, that is a great tool if their pupils work well with L1 resources. Using L1 glosses can also be an overt expression of respect for multilingualism and pupils' identities on behalf of the teacher. If teachers do not have such resources available to them, however, this is of no detriment to EAL pupils' abilities to acquire EAL per the findings of the current study, though future research should replicate this study with greater sample sizes to confirm its findings.

5.4.2 Future research

The findings of the current study contribute to the overall literature on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning and should be considered in the context of prior research conducted with school-aged populations. The findings of the current study support those of Arpaci (2016) and Choi (2016), which found no effect of gloss language (English vs. L1) on reading comprehension or vocabulary learning on immediate and delayed post-tests. These findings are not supported by those of Miyasako (2002), Hu et al. (2014), and Kongtawee and Sappapan (2018), where Miyasako (2002) and Hu et al. (2014) found that L2 English glosses were more beneficial for high proficiency learners and all three studies found L1 glosses to be more beneficial for low proficiency learners. The current study utilized intermediate learners as participants and sought to better understand learners that were neither absolute beginners nor advanced learners.

It is important to note that prior research on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning has been conducted with foreign language learners of primarily English, and most previously published studies use adult participants rather than secondary school-aged participants. The five aforementioned studies with secondary school pupils make up some of the only research that has been conducted with younger learners instead of adults. No research to date has been published on this topic with EAL learners.

Future research should attempt to replicate the current study with additional school-aged learners. Ideally, more research will be conducted with school-aged learners of a variety of ages and levels. It would be advantageous to replicate this study with high- and low-proficiency learner conditions to further investigate how the effect of L1 vs. L2 glosses may depend on learner proficiency. This would also allow for further exploration to support or refute the results of Hu et al. (2014), Kongtawee and Sappapan (2018), and Miyasako (2002),

which found differential effects of glossing language on reading comprehension and vocabulary learning for high- vs. low-proficiency foreign language learners.

Future research should also utilize participants of a wider range of ages, if possible. School-aged (EAL) learners are severely understudied when it comes to the effect of glossing language on reading comprehension and vocabulary learning. The current study adds to the field in terms of studying school-aged populations, but more research needs to be conducted, ideally with both primary and secondary school pupils. Work with secondary school pupils is scant—mostly limited to the five studies cited above as well as the current study—and research with primary school pupils is essentially non-existent. This gap in the literature may be in part due to the ethical considerations required to work in schools with pupils—it is undoubtedly more straightforward to conduct research with adult undergraduates—but such considerations should not deter researchers from working with school-aged populations entirely.

Though it seems increasingly evident that there is no effect of glossing language on reading comprehension and vocabulary learning, these results continue to need to be replicated on a larger scale and with greater volume in order to be supported. Future research should also focus on working with EAL pupils to better understand this learner population as it differs from foreign language learners. There is ultimately a dire need for a greater volume of research on this topic with school-aged language learners more generally as well as with EAL pupils more specifically. Future research should attempt to replicate the current study with a higher volume of participants overall and with more EAL pupils.

Additionally, future research should conduct such replications with more consideration for eligibility criteria. As will be highlighted in the limitations section of this chapter, the eligibility criteria for the current study were quite relaxed due to logistical challenges working with schools within the timeframe allotted to complete the current study. Future research, when possible, should also consider participants' L1 literacy abilities, L1 and English proficiencies, and time spent learning English to recruit a more homogenous sample of EAL pupils. This will allow for more definite conclusions to be drawn from research findings in addition to utilizing an improved study design.

Finally, future research should consider participant recruitment methods in designing and implementing any interventions. While a school setting may be an ideal location to work with pupils and emulate conditions where they receive EAL support, the limitations section of this chapter highlights several challenges in working with schools to recruit study participants. Alternative recruiting methods may prove more successful than recruiting via

schools or snowball sampling, and this is something to consider in future research with EAL populations. Future research should also recognize the time and effort required to work with schools and plan accordingly.

5.4.3 Theory: Should EAL learners be considered differently?

A significant criticism of the existing literature on L1 vs. L2 glosses to aid reading comprehension and vocabulary learning is that the participant population includes primarily adult learners of L2 English. EAL pupils are severely under-studied, and it is therefore difficult to extend research findings to make recommendations regarding best practices to support EAL pupils. Such considerations about the state of the literature extend to relevant theories, as well. It is important to consider whether Kroll and Stewart (1994)'s Revised Hierarchical Model and Jiang (2000)'s psycholinguistic model of lexical representation are applicable to EAL pupils in the same way that they pertain to adult foreign language learners.

It is important to highlight that Kroll and Stewart (1994)'s Revised Hierarchical Model is based on work conducted with undergraduate students in the Netherlands learning L2 English. This population has a low degree of overlap with EAL pupils in the UK–they differ significantly in terms of age, language background, and foreign vs. additional language learning status. It is unknown whether the Revised Hierarchical Model also applies to children and adolescents learning the language of instruction rather than a foreign language in a designated classroom setting. The same holds for Jiang (2000)'s psycholinguistic model of lexical representation, as it was developed with adult foreign language learners as the language learners in the model. These theories, while helpful in informing our understanding of SLA, do not apply broadly to those learning another language. There is a high degree of diversity in typical EAL contexts. In the current study, 17 different L1s were represented among 32 pupils across 3 schools. Most—if not all—research with foreign language learners exploring the effects of glossing language on reading comprehension and vocabulary learning has been conducted with participants who all share the same L1.

Additional research with EAL pupils should seek to address the applicability of the Revised Hierarchical Model and Jiang (2000)'s theory to EAL pupils once a higher volume of work with EAL pupils on vocabulary learning has been conducted and published.

5.5 Limitations

There were various limitations of the current study, including but not limited to recruiting a representative sample of EAL learners as participants, the rate of participant attrition between session 1 and session 2, and the logistical challenges of implementing eligibility criteria in recruiting study participants.

5.5.1 Recruiting a representative sample of EAL learners

Participant recruitment occurred primarily through schools, and this was a significant limitation for the current study. Participants from School 1 were recruited via the school's EAL coordinator. For the EAL coordinator to be able to contact pupils to participate in the study, they needed to at least have been somewhat familiar with each other. It is therefore likely that all of the EAL pupils recruited from School 1 were already receiving additional EAL support at school. EAL pupils who had not been identified as needing extra help or who were otherwise unfamiliar with the EAL coordinator would therefore not have been recruited to participate in the study. The participant sample from School 1 probably does not reflect the overall EAL population at School 1, but rather the EAL population who receives EAL-specific support.

In the case of participants recruited from School 2, every participant was a pupil currently enrolled in the school's Jacari program. In order to participate in the Jacari program at School 2, teachers must recommend their pupils to the program and parents must allow their child(ren) to participate. This likely does not result in a representative sample of EAL pupils from School 2 who participate in Jacari, rather the participants from School 2 were all EAL pupils already receiving additional support at school.

Though School 3 does not work with Jacari, all participants were recruited via the EAL center at the school. School 3 has a designated room with EAL support staff and resources where EAL pupils can go during their free periods during the school day. In order to have been recruited for the current study from School 3, participants would have to have frequented the EAL center to have been handed a consent form before the study and again on the day of data collection in order to participate. It is evident that not all EAL pupils are involved in the relevant EAL programs at their schools given the low number of overall participants in the current study compared to the high percentage of EAL pupils at each school and generally in the UK.

Recruiting via schools is likely the most straightforward method of identifying and recruiting EAL learners as participants, however there is an unfortunate number of logistical challenges associated with this recruitment method. Schools are a difficult administrative body to work with due to their low response rate. Only two out of the twenty-one schools which work with Jacari responded positively to the Bristol and Oxford Jacari representatives' requests to facilitate participant recruitment for the current study. The other nineteen schools either declined this request or simply did not respond, even after repeated attempts to receive a response on behalf of the Jacari representative.

For the two schools willing to help recruit participants for the current study, it took over a month to receive administrative approval from the school's headmaster in both cases. Another issue is the matter of sending consent forms home to be completed; students at all three participating schools failed to return consent forms before data collection took place and therefore could not participate in the study despite being present at the time of data collection.

Despite the limitations of recruiting participants via schools, this still seems to be a far more effective option than snowball sampling, as only two of the thirty-two total participants were recruited via snowball sampling for the current study. The other thirty participants were recruited entirely from Schools 1, 2, and 3. It is unclear whether other methods of recruiting participants (e.g. through other official bodies or community-based groups) would have proven more successful, or if recruiting via schools is the most effective way to recruit school-aged children to participate in research despite the associated logistical challenges.

5.5.2 Sample size

Another consideration in recruiting a representative sample of EAL learners is the size of the sample. The total number of participants in the current study was 32, and, as will be discussed in section 5.5.3, only 8 participants completed the delayed post-test. 32 participants is already a low sample size and limits the strength of the findings of the current study, and 8 participants completing the delayed post-test is even more extreme. The small sample size of the current study had several effects on its findings.

First, a low sample size results in a less representative sample; 32 EAL pupils are less representative of the overall EAL population in the UK schools compared to 100 or 1000 pupils. This affected the skewness and kurtosis of the sample, as smaller samples are more affected by one or two extreme data points than a larger sample.

Second, a small sample size limits the experimental methods of the current study. It became evident quite early on that participant recruiting was going to be a challenge, and so the decision was made not to include a control group in the current study to maximize participants in the two experimental groups. Glosses have already been shown to be beneficial for reading comprehension and vocabulary learning, so the current study sought to investigate differential effects of glossing language (L1 vs. English) and not whether glossing itself is beneficial.

Third, a low sample size means a low statistical power of the results and a lower likelihood of observing statistically significant effects. Given the initially small sample size and high rate of attrition from immediate to delayed post-tests, it is difficult to make any steadfast conclusions from the results of the current study.

5.5.3 Attrition

There was an extremely high rate of participant attrition from session 1 to session 2 of the current study. This occurred due to several factors. In the cases of School 1 and School 2, several participants who were present at school for session 1 were absent from school on the day of session 2. Due to the controlled nature of the study and its procedure, pupils who were absent on the day of the second session were unable to complete the delayed post-test for the study. In addition, several pupils from School 1 and School 2 were absent from school for session 1 but present for session 2. In order to maximize the overall number of participants, these pupils completed the first part of the study during the second session, but they were unable to complete the second part due to time constraints and scheduling conflicts. Due to difficulties in getting approval to work with School 3, there was only time for one session at the school before the end of the school year. All participants from School 3 therefore only completed session 1 of the current study.

Prior research working with school-aged populations, such as Arpaci (2016), has not exhibited the same attrition between the immediate and delayed post-tests while maintaining a larger number of participants in each experimental condition. A potential reason for this may be that Arpaci (2016) utilized foreign language classes to recruit participants, therefore working with participants during their scheduled class time. A difficulty in recruiting participants for the current study was the necessity of pulling them out of their regular classes to participate, which required additional coordination with teachers and pupils. Future

research with EAL pupils should consider these challenges in recruiting a sufficient number of participants and implementing the intervention sessions.

5.5.4 Eligibility criteria

An additional limitation of the current study was the eligibility criteria used to recruit participants. Due to the aforementioned logistical challenges working with schools as well as the timeline to complete the study, eligibility criteria was modified so that any EAL pupil currently enrolled in primary or secondary school with some level of L1 proficiency was able to take part in the study. Under ideal conditions, more eligibility criteria would have been considered in recruiting participants, such as L1 literacy abilities, L1 and English proficiency levels, and the length of time participants had been learning English. Considering these additional factors would allow for a more homogenous sample to further ensure that findings are due to the study and interventions themselves and not due to differences between participants.

Chapter 6: Conclusion

The purpose of this study was to address the lack of national curriculum for or published research on EAL learners in the UK. Such gaps have resulted in highly variable learning environments for EAL pupils which depend entirely on their school's resources and proportion of EAL learners accessing those resources. There are neither generally adopted guidelines from the UK government nor adequate research regarding how to best support EAL learners, and this has led to a situation where teachers themselves must decide how they can better support the EAL learners in their classrooms.

In regards to glossing as a specific tool for SLA, there has been a significant volume of research conducted on how glosses can be used to aid reading comprehension and vocabulary learning focusing on the effectiveness of L1 vs. L2 glosses (Chang & Good, 2009; Kim et al., 2024; Öztürk & Yorgancı, 2017). There has not, however, been glossing research conducted with diverse participant populations, as the majority of this work has been conducted with undergraduate EFL classes (Abraham, 2008; A-Jabri, 2009; Barabadi et al., 2018; Cheng & Good, 2009; Ertuerk, 2016; Farvardin & Biria, 2012; Hulstijn et al., 1996; Lee & Macaro, 2013). Only a handful of studies have utilized secondary school pupils as participants (Arpaci, 2016; Choi, 2016; Hu et al., 2014; Kongtawee & Sappapan, 2018; Miyasako, 2002). These studies also used foreign language learners of L2 English as their participant population; there has been no research on L1 vs. L2 glossing conducted with EAL pupils prior to the current study. My dissertation addressed this gap in the literature by investigating the effect of L1 vs. L2 English glosses on reading comprehension and vocabulary learning with EAL pupils.

The literature review chapter of this dissertation explored the theoretical basis of L2 vocabulary learning, delving into Kroll and Stewart (1994)'s Revised Hierarchical Model and Jiang (2000)'s psycholinguistic model of lexical representation. It demonstrated the benefit of using the L1 for SLA and gave an overview of work that has been conducted on L1 use in the L2 classroom. Glosses as a tool to aid reading comprehension and vocabulary learning were defined in detail with reference to the literature on glossing both generally and in greater detail. Several studies were clarified which investigated the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning with an emphasis on studies conducted with school-aged learners.

A recent systematic review, Kim et al. (2024), published on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning highlighted that the majority of research conducted on this topic involves adult participants and focuses on foreign language learning contexts. The few studies which have used school-aged foreign language learners report somewhat mixed results, where the findings of Choi (2016) and Arpaci (2016) demonstrated no significant difference in using L1 vs. English glosses to aid reading comprehension and vocabulary learning. The results of Kongtawee and Sappapan (2018), however, indicated a benefit of L1 over English glosses for low achieving students, and the results of Miyasako (2002) and Hu et al. (2014) indicated a benefit of L1 glosses for low proficiency learners and L2 glosses for high proficiency learners. Further engagement with these studies suggested that L1 glosses may be more beneficial for lower proficiency learners, though this finding requires additional support in the literature. This analysis of the current state of the literature highlighted several gaps, especially the lack of research conducted with EAL pupils, and informed the research questions and methodology of the current study.

Based on the findings of the literature review, a parallel groups randomized trial to compare the effectiveness of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning was conducted with EAL pupils. It found that, overwhelmingly, there was no effect of glossing language on participants' reading comprehension or productive or receptive vocabulary knowledge of target words. Participants understood the text and learned the target words equally well regardless of glossing condition.

The implications of the findings of the current study are that, until further research is published on this topic, teachers should utilize whatever language gloss is most accessible to them and that is preferred by their EAL pupils. If teachers have the resources to be able to use their pupils' L1s in the classroom, this may support important respect for multilingualism in schools and is unlikely to be detrimental to pupils' academic achievement, but it is not more advantageous than providing glosses in English. Conversely, if teachers do not have the resources to provide L1 glosses to their EAL pupils, they are not disadvantaging them. The time and effort of such teachers can—and should—be directed towards teaching strategies and resources to support EAL learners for which there is more established empirical evidence.

There remains significant work to be done on the use of L1 vs. L2 glosses to aid reading comprehension and vocabulary learning, especially for EAL pupils. Theory should be revised to include younger learners and additional types of language learners other than foreign language learners, such as EAL. In particular, future research should focus on

utilizing school-aged learners and EAL pupils in their participant populations. Future research should also build off the current study with improved methodology, such as recruiting a higher number of EAL pupils as participants and controlling for a more homogenous participant sample. This would allow for more sound conclusions to be drawn and recommendations made for the use of L1 vs. L2 glosses in the classroom, which may inform future policy for EAL pupils in the UK.

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Appendices

Appendix A: Ethics approval, information sheets, and consent forms

SOCIAL SCIENCES & HUMANITIES
INTERDIVISIONAL RESEARCH ETHICS COMMITTEE
DEPARTMENTAL RESEARCH ETHICS COMMITTEE

Department of Education
15 Norham Gardens, Oxford OX2 6PY
student.curec@education.ox.ac.uk; staff.curec@education.ox.ac.uk

Madeline Noyes
Department of Education, Social Sciences Division
University of Oxford

3 March 2024

Dear Madeline,

Research ethics approval

Research title: The effects of English vs first-language glosses to aid reading comprehension for EAL students

Research ethics reference: EDUC_C1A_24_066

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:

Personal data: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

In-person activities: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

Amendments: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely

Dr Gary Snapper

DREC member

cc: Dr Hamish Chalmers

DEPARTMENT OF EDUCATION

Hamish Chalmers
hamish.chalmers@education.ox.ac.uk
Madeline Noyes, MSc Student
madeline.noyes@kellogg.ox.ac.uk

The effects of different tools to aid reading comprehension for EAL learners

INFORMATION SHEET FOR STUDENTS AGED 11 TO 15 YEARS

Central University Research Ethics Committee Approval Reference: EDUC_C1A_24_066

You are invited to join in a research study. Our names are Hamish and Maddie and we work at the University of Oxford in the Department of Education

Before you decide if you would like to join in, it's important to understand what the research is about, why we're doing it and what it would involve for you. Please read and think about this leaflet carefully. Please feel free to talk to your family, friends, or the researchers about it if you want.

If anything isn't clear or you have more questions you can ask your parent/guardian to give us a call and we can discuss it with you and your parent/guardian.

Why are we doing this research?

We are conducting this study to see if different types of tools aid reading comprehension better or worse for learners of English as an Additional Language.

Why have I been invited to take part?

Explain how they have been identified as a potential participant and mention any inclusion or exclusion criteria, including age range. You should say how many other participants will be recruited.

Do I have to take part?

No - It is up to you to decide if you want to take part in this research. You are free to stop taking part at any time during the research without giving a reason by telling your teacher, the researcher or your parent/guardian. You do not have to say why and this will not affect your education.

If you decide to stop, no one will be upset with you.

What will happen if I take part in the research?

If you choose to take part in this research, you will participate in three sessions with me, all 30 mins or shorter.

In the first session, you will answer some background questions about the language(s) you speak at school and at home.

In the second and third sessions, which will be a few weeks apart, you will read a short passage, no longer than 5-10 minutes, and then you will answer some questions about the passage on a worksheet.

What are the possible disadvantages and risks in taking part?

There are no possible disadvantages or risks in taking part in this research.

Are there any benefits in taking part?

There will be no direct or personal benefit to you from taking part in this research.

What information will be collected and what happens to the results of the research?

Results are kept strictly confidential, and only the people doing the research, or helping with the research, can look at the data. Only a number will be used to identify you, and all information and results are kept on a password-protected server in the University. If your face or voice is accidentally recorded, we will make sure that recordings are securely stored (ideally encrypted) and only shared with the rest of the research team. Researchers will change the names of your school, teacher, and all the students when we write about the research. No one will know that you have taken part unless you tell them yourself.

The findings from the research will/may be written up as a masters dissertation and potentially published for the public to read. No reported information about the study's results or information about its participants will disclose your identity.

If we want to use the information for anything else, we will ask your permission. At the end of the research, we will write to your school about what was discovered. You are welcome to read this if you are interested.

All research data and records will be stored for 3 years after publication or public release of the work of the research. Third parties may be given access to research data for monitoring and/or audit of the research, or for data storage purposes.

Data Protection

The University of Oxford is the data controller with respect to your personal data, and as such will determine how your personal data is used in the research.

The University will process your personal data for the purpose of the research outlined above. Research is a task that we perform in the public interest.

Further information about your rights with respect to your personal data is available from https://compliance.web.ox.ac.uk/individual-rights.

Will anyone else know I'm doing this?

We will keep your information private. This means we will only tell those who have a need or right to know, such as the research team and your parent/guardian. We will only share information that has your name and

address removed.

What if I don't want to take part in the research anymore?

Just tell your parent/guardian and the people carrying out the research that you don't want to take part. You don't have to give a reason and no one will be annoyed with you. It is YOUR choice.

Who is organising and funding the research?

Dr. Hamish Chalmers is the Principal Investigator organising this research along with Madeline Noyes, a current MSc student.

Who has reviewed the research?

This research has received ethics approval from a subcommittee of the University of Oxford Central University Research Ethics Committee. (Ethics reference: EDUC_C1A_24_066).

What do I do now?

Please tell your parents, guardians and/or teacher whether you are happy to take part.

What if there is a problem or something goes wrong?

Please tell us if you are worried about any part of this research, by contacting the researcher madeline.noyes@kellogg.ox.ac.uk. You may also talk to your teacher/parent/guardian who will let the researcher know. If you are still unhappy or wish to make a complaint, either you or your teacher/parent/guardian can contact the chair of the Research Ethics Committee at the University of Oxford:

Chair, **Social Sciences & Humanities Interdivisional Research Ethics Committee**; Email: ethics@socsci.ox.ac.uk; Address: Research Services, University of Oxford, Boundary Brook House, Churchill Drive, Headington, Oxford OX3 7GB

Thank you for reading – please ask me any questions.

Example email to parents of participants recruited via snowball sampling:
To whom it may concern,

My name is Maddie, and I am conducting a study that I would like to invite your students/you to take part in. I am investigating the effects of English- vs. first-language glosses (vocabulary aids) on reading comprehension for EAL learners. I am a current MSc student at the University of Oxford in the Department of Education, supervised by Hamish Chalmers (hamish.chalmers@education.ox.ac.uk). Taking part in the study would involve three meetings over the course of about a month, with all of the sessions lasting under 30 minutes. The first session asks learners to complete some demographic information about their language background and a vocabulary pre-test. The second and third sessions will include the reading of a short passage (5-10 minutes) and then the completion of some follow-up worksheets. The second and third session will be spaced a few weeks apart.

No identifiable information will be taken from participants, and all participants will be identified via a participant ID only. Collected data will be stored securely through the University of Oxford servers.

If you feel comfortable (allowing your students) to take part in this study, please let me know by responding to this email.

Best,
Madeline Noyes
madeline.noyes@kellogg.ox.ac.uk

Department of Education

Madeline Noyes
madeline.noyes@kellogg.ox.ac.uk

ASSENT FORM FOR CHILDREN UNDER 16

The effects of English- vs first-language glosses to aid reading comprehension for EAL students

Child/Young Person (or if unable, parent/researcher/teacher on their behalf) to circle all they agree with:

- Has somebody else explained this project to you? Yes/No
- Do you understand what this project is about? Yes/No
- Have you asked all the questions you want? Yes/No
- Have you had your questions answered in a way you understand? Yes/No
- Do you understand it's OK to stop taking part at any time? Yes/No
- Are you happy to take part? Yes/No

If any answers are "no" or you don't want to take part, that's OK! No one will be cross with you.

If you do want to take part, please write your name below, or place your thumb print in the box.

Your name _____

Date _____

The researcher who explained this project to you needs to sign too:

Print Name _____

Sign _____

Date _____

Thank you!

Department of Education

Madeline Noyes
madeline.noyes@kellogg.ox.ac.uk

ASSENT FORM FOR CHILDREN UNDER 16

The effects of English- vs first-language glosses to aid reading comprehension for EAL students

Child/Young Person (or if unable, parent/researcher/teacher on their behalf) to circle all they agree with:

- Has somebody else explained this project to you? Yes/No
- Do you understand what this project is about? Yes/No
- Have you asked all the questions you want? Yes/No
- Have you had your questions answered in a way you understand? Yes/No
- Do you understand it's OK to stop taking part at any time? Yes/No
- Are you happy to take part? Yes/No

If any answers are "no" or you don't want to take part, that's OK! No one will be cross with you.

If you do want to take part, please write your name below, or place your thumb print in the box.

Your name _____

Date _____

The researcher who explained this project to you needs to sign too:

Print Name _____

Sign _____

Date _____

Thank you!

Appendix B: Language Background Questionnaire, English Proficiency Measure, Vocabulary Pre-Test

Language Background Questionnaire

Participant ID:
Name:

Language Questionnaire:

1. What language(s) do you speak at home?

---

2. How often do you speak your first language(s)? Do you use your home language(s) at school or with friends?

---

3. Can you read in your home language?

---

4. How many years have you been learning English?

---

5. How old are you? (Ex. I am # years old.)

---

6. How often do you speak English? (circle one)

a. not at all b. sometimes c. often d. all the time

7. When you read in English, do you usually:

a. understand nothing
b. understand the main idea
c. understand the main idea and some details
d. understand everything

English Proficiency Measure

Participant ID:

Choose the best answer for each question.

1. What animal is this?

a. This is a bear.
b. This is a turtle.
c. This is a fish.
d. This is a monkey.

2. What color is the apple?

The apple is yellow.
The apple is blue.
The apple is red.
The apple is orange.

3. Describe the picture.

a. It's a sunny day.
b. It's a cloudy day.
c. It's a windy day.
d. It's a snowy day.

4. Did you have a good weekend?
a. Yes, I have.
b. Yes, I did.
c. Yes, me too.
d. Yes, you have.

5. I love your shirt, Carlos!
a. Thank you, so do I!
b. Yes, it is!
c. I do not!
d. Yes, your shirt!

6. Word gap: circle the best answer

Look out at the ocean! If there (are / be / have) no waves, you can see the horizon. There are sharks, whales, and crabs. There are all kinds (for / from / of) animals in the ocean. Tourists can visit the beach, and boats have (take / took / taken) people out to sea. The first boat (whose / what / that) sailed across the Atlantic Ocean completed its journey in 1563.

Vocabulary Pre-Test

Participant ID:

Please answer the following questions as best you can. It is okay if you do not know the answer to every question, just try your best! Raise your hand if you have any questions.

1. If something is eradicated, this means _____.
    a. It is very big.
    b. It eats both plants and animals.
    c. It disappeared forever.
    d. It had sharp teeth.

2. If an animal is enormous, it is _____.
    a. A plant-eater
    b. Really big
    c. A type of dinosaur.
    d. Really fast.

3. What happens during an extinction?
    a. Animals eat dinner.
    b. The weather gets warmer.
    c. Something disappears forever.
    d. There are a lot of plants.

4. What are fossils?
    a. Changes in temperature
    b. Types of dinosaurs
    c. Plants
    d. Really old parts of animals in the ground

5. Something that is threatening is _____.
    a. Gentle
    b. Scary
    c. Popular
    d. Colourful

English

Dinosaurs

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Some dinosaurs were mean. They were fast and **threatening** animals. These dinosaurs were like the ninjas of the dinosaur world. They used their intelligence, speed, and strength to catch animals for food. Imagine these dinosaurs running around and hunting other animals.

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The dinosaurs were **eradicated** without warning. They did not know what was going to happen to them. Today, we continue to learn about the secrets of the dinosaurs, and we try to understand their special history. There are a lot of films and books about dinosaurs. Sometimes, people even imagine what it would be like if dinosaurs lived on Earth today instead of millions of years ago!

Fossils: old parts of dinosaurs found after many years

Threatening: scary, planning to do something bad

Enormous: very, very big

Extinction: the total disappearance of something
Example: The extinction of the dinosaurs means there are no dinosaurs anymore.

Eradicate: to make go away, to get rid of

Dinosaurs

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Fossils:
Mbetje të vjetra të dinosaurëve të gjetur pas shumë vitesh

Threatening:
E frikshme, duke planifikuar të bëjë diçka të keqe

Enormous:
Shumë, shumë I madh

Extinction:
Zhdukja totale e diçkaje.
Shembull: Zhdukja e dinosaurëve do të thotë se nuk ka më dinosaur gjalle.

Eradicate:
Te largosh dicka, të hequrit qafe

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Fossils:
العثور على أجزاء قديمة من الديناصورات بعد سنوات عديدة من العثور عليها

Threatening:
التهديد. مخيف، يخطط لفعل شيء سيء

Enormous:
كبير جداً جداً جداً

Extinction:
الاختفاء التام لشيء ما. مثال: انقراض الديناصورات يعني لم يعد هناك ديناصورات بعد الآن

Eradicate:
للتخلص من، للتخلص من

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Fossils: বহু বছর পর পাওয়া গেল ডাইনোসরের পুরনো অংশ

Threatening: ভীতিকর, খারাপ কিছু করার পরিকল্পনা

Enormous: খুব, খুব বড়

Extinction: কিছুর সম্পূর্ণ অন্তর্ধান
উদাহরণ: ডাইনোসরের বিলুপ্তি মানে আর কোনো ডাইনোসর নেই।

Eradicate: পরিত্রাণ পেতে

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Fossils: стари части от динозаври, намерени след много години

Threatening: страшен, планиращ да направи нещо лошо

Enormous: много, много голям

Extinction: пълното изчезване на нещо
Пример: Изчезването на динозаврите означава, че вече няма динозаври.

Eradicate: да се отърва, да се отърва от

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Fossils:
بخش‌های قدیمی دایناسورها بعد از سال‌ها پیدا شد

Threatening:
ترسناک، پلان گذاری برای انجام یک کار بد

Enormous:
بسیار زیاد بزرگ

Extinction:
بطور کالم ناپدید شدن یک چیزی. مثال: انقراض دایناسورها به این معنی است که دیگر دایناسور وجود ندارد

Eradicate:
از بین بردن یا ریشه کن کردن
دور شدن، غالب شدن بر یک چیزی

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Fossils: بخش های قدیمی دایناسورها پس از سال ها پیدا شد

Threatening: ترسناک، برنامه ریزی برای انجام کار بد

Enormous: خیلی خیلی بزرگ

Extinction: ناپدید شدن کامل چیزی
مثال: انقراض دایناسورها به این معنی است که دیگر دایناسور وجود ندارد.

Eradicate: دور شدن، خلاص شدن از شر

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Fossils: bagian tua dinosaurus yang ditemukan setelah bertahun-tahun

Threatening: menakutkan, berencana melakukan sesuatu yang buruk

Enormous: sangat, sangat besar

Extinction: hilangnya sesuatu secara total
Contoh: Kepunahan dinosaurus berarti tidak ada dinosaurus lagi.

Eradicate: untuk membuat pergi, untuk menyingkirkan

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Fossils: Ritrovate vecchie parti di dinosauri dopo molti anni

Threatening: spaventare, progettare di fare qualcosa di brutto

Enormous: molto, molto grande

Extinction: la totale scomparsa di qualcosa
Esempio: L'estinzione dei dinosauri 84ignific ache non ci sono più dinosauri.

Eradicate: far sparire, sbarazzarsi di

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Fossils: 오랜 세월이 지난 후에 발견된 공룡의 오래된 부분들

Threatening: 무서운, 나쁜 짓을 계획하는

Enormous: 매우, 매우 큰

Extinction: 무언가가 완전히 사라지는 것
예시: 공룡이 멸종했다는 것은 더 이상 공룡이 없다는 것을 의미합니다.

Eradicate: 사라지게 하고, 제거하기 위해

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Fossils:
د پخواني ډيناسورو غړي چې له ډيرو کلونو وروسته موندل شوي وي

Threatening:
ډاروونکی، د يو بد کار پلانول

Enormous:
غټ، ډير غټ

Extinction:
د يو څه بشپړ ورکيدل. د بيلګې په توګه: د ډيناسور له منځه تلل يعنې چې نور ډيناسورونه هيڅ نه وي

Eradicate:
د يو څه ختمول، له منځه وړل

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Fossils: stare części dinozaurów odnalezione po wielu latach

Threatening: przerażający, planujący zrobić coś złego

Enormous: bardzo, bardzo duży

Extinction: całkowite zniknięcie czegoś Przykład: Wyginięcie dinozaurów oznacza, że nie ma już dinozaurów.

Eradicate: sprawić, że odejdzie, pozbyć się

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Fossils: partes antigas de dinossauros encontradas ao fim de muitos anos

Threatening: assustador, planeia fazer algo de mau

Enormous: muito, muito grande

Extinction: o desaparecimento total de algo.
Exemplo: A extinção dos dinossauros significa que já não existem dinossauros

Eradicate: fazer desaparecer, livrar-se de

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Fossils:
ਕਈ ਸਾਲਾਂ ਬਾਅਦ ਮਿਲੇ ਡਾਇਨਾਸੋਰ ਦੇ ਪੁਰਾਣੇ ਅੰਗ
Threatening:
ਡਰਾਉਣਾ, ਕੁਝ ਬੁਰਾ ਕਰਨ ਦੀ ਯੋਜਨਾ ਬਣਾਉਣਾ
Enormous:
ਬਹੁਤ, ਬਹੁਤ ਵੱਡਾ
Extinction:
ਕਿਸੇ ਚੀਜ਼ ਦਾ ਬਿਲਕੁੱਲ ਗਾਇਬ ਹੋ ਜਾਣਾ। ਉਦਾਹਰਨ: ਡਾਇਨਾਸੋਰਾਂ ਦੇ ਅਲੋਪ ਹੋਣ ਦਾ ਮਤਲਬ ਹੈ ਕਿ ਹੁਣ ਡਾਇਨਾਸੌਰਸ ਮੌਜੂਦ ਨਹੀਂ ਹਨ
Eradicate:
ਦੂਰ ਭੇਜਣਾ, ਛੁਟਕਾਰਾ ਪਾਉਣ ਲਈ

Dinosaurs

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Fossils: Останки динозавров, найденные спустя много лет

Threatening: Пугающий, грозящий причинить вред

Enormous: Очень-очень большой

Extinction: Полное исчезновение чего-либо.
Пример: вымирание динозавров означает, что диназвров больше не существует.

Eradicate: Заставить исчезнуть, избавиться

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Fossils: ඩයිනෝසෝරයන්ගේ පැරණි කෙඳිස් වසර ගණනාවකට පසු සොයා ගනුනේ

Threatening: භයානක, නරක දෙයක් කිරීමට සැලසුම් කිරීම

Enormous: ඉතා ඉතාවිශාල

Extinction: යමක් සම්පූර්ණයෙන් අතුරුදහන් වීම
උදාහරණය: ඩයිනෝසෝරයන් වඳ වී යෑමෙන් අදහස් වන්නේ ඩයිනෝසෝරයන් නවදුරටත් නොමැති බවයි.

Eradicate: ඉවත් කිරීමට, ඉවත් කිරීමට

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Fossils: partes antiguas de dinosaurios encontradas después de muchos años

Threatening: asustado, planeando hacer algo malo

Enormous: muy, muy grande

Extinction: la desaparición total de algo
Ejemplo: La extinción de los dinosaurios significa que ya no hay dinosaurios.

Eradicate: hacer desaparecer, deshacerse de

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Fossils:
பல ஆண்டுகளுக்குப் பிறகு டைனோசர்களின் பழைய பாகங்கள் கண்டுபிடிக்கப்பட்டன
Threatening:
பயமுறுத்தும், மோசமான ஒன்றைச் செய்யத் திட்டமிடுதல்
Enormous:
மிக மிகப் பெரியது
Extinction:
ஏதோ மொத்தமாக காணாமல் போனது. உதாரணம்: டைனோசர்களின் அழிவு, இனி டைனோசர்கள் இல்லை என்று அர்த்தம்
Eradicate:
ஒன்றை போக செய்தல், ஒன்றை விட்டொழிக்க

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Fossils:
Dinozorların eski parçaları yıllar sonra bulundu

Threatening:
Korkutucu, kötü bir şey yapmayı planlıyor

Enormous:
çok, çok büyük

Extinction:
Bir şeyin tamamen ortadan kalkması. Örnek olarak: Dinozorların neslinin tükenmesi demek Artık dinozor yok.

Eradicate:
Uzaklaştırmak, kurtulmak

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Fossils:
Старі частини динозаврів, знайдені через багато років

Threatening:
Страшно, коли плануєш зробити щось погане

Enormous:
Дуже, дуже великий

Extinction:
Повне зникнення чогось.
Приклад: Вимирання динозаврів означає що динозаврів більше немає

Eradicate:
Змусити піти, позбутися

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Fossils: ڈائنوسار کے پرانے حصے کئی سالوں بعد مل گئے۔

Threatening: خوفناک، کچھ برا کرنے کی منصوبہ بندی

Enormous: بہت، بہت بڑا

Extinction: کسی چیز کا مکمل غائب ہونا
مثال: ڈائنوسار کے معدوم ہونے کا مطلب ہے کہ اب کوئی ڈائنوسار نہیں ہے۔

Eradicate: دور جانا، چھٹکارا حاصل کرنا

Appendix D: Immediate and delayed post-test

Immediate Post-Test

Participant ID:

What have you learned today?

Please answer the following questions as best you can. It is okay if you do not know the answer to every question, just try your best! Raise your hand if you have any questions.

1. What was the main topic of the reading?
    a. food
    b. dinosaurs
    c. the future
    d. fish

2. How long ago did the dinosaurs live?
    a. Millions of years ago.
    b. Thousands of years ago.
    c. Hundreds of years ago.
    d. Dinosaurs still live today.

3. Which of the following were mentioned in the reading?
    a. There are different types of dinosaurs.
    b. Dinosaurs do not live on Earth today.
    c. Some dinosaurs ate other animals, and some dinosaurs only ate plants. d. All of the above

4. Why did the dinosaurs disappear?
    a. They did not like Earth anymore.
    b. A big asteroid hit Earth.
    c. They flew to outer space.
    d. They ran out of food.

5. What do we **not** know about dinosaurs?
    a. What dinosaurs ate.
    b. When dinosaurs lived.
    c. What language dinosaurs spoke.
    d. How big different dinosaurs were.

6. As time went on, a big event led to the _____ of all the dinosaurs.

7. Some dinosaurs were mean.

They were fast and _____ animals.

8. The dinosaurs were _____ without warning.

9. These dinosaurs were nice to other animals and did not try to eat them despite their _____ size.

10. The dinosaurs left behind clues from long ago in the form of _____.

11. The dinosaurs were eradicated, meaning _____.

a. The dinosaurs roamed the earth.
b. The dinosaurs ate both plants and animals.
c. The dinosaurs disappeared forever.
d. The dinosaurs had sharp teeth.

12. What does it mean that a dinosaur was enormous?

a. It only ate plants.
b. It was really big.
c. It was a type of dinosaur.
d. It was really fast.

13. What happens during an extinction?

a. The dinosaurs eat dinner.
b. The weather gets warmer.
c. The dinosaurs disappear.
d. There are a lot of plants.

14. What are fossils?

a. Changes in temperature

b. Types of dinosaurs

c. Plants

d. Really old parts of animals in the ground

15. Something that is threatening is _____.

a. Gentle

b. Scary

c. Popular

d. Colourful

Participant ID:

What have you learned?

Please answer the following questions as best you can. It is okay if you do not know the answer to every question, just try your best! Raise your hand if you have any questions.

1. As time went on, a big event led to the _____ of all the dinosaurs.

2. Some dinosaurs were mean.

They were fast and _____ animals.

3. The dinosaurs were _____ without warning.

4. These dinosaurs were nice to other animals and did not try to eat them despite their _____ size.

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d. Really old parts of animals in the ground

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c. Popular

d. Colourful