

Lexical development in L2 children from partial immersion and early EFL schools: the cognate facilitation effect

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Abstract

An increasing number of L2 children follow a partial immersion education as an attempt to acquire the second language in a more naturalistic environment. However, the implications of partial immersion schools on L2 acquisition are not entirely known. The aim of the current study is to investigate the impact of partial immersion education on young L2 children's receptive and productive vocabulary knowledge. Of great significance was the degree to which L2 children rely on their L1 lexical knowledge when using the L2 vocabulary. 50 native Dutch children learning English as a second language participated in the current study. 25 were following a partial immersion education and 25 an early EFL educational program. L2 children's receptive vocabulary knowledge was examined with the PPVT-4 vocabulary test and their productive vocabulary knowledge was measured with the EVT-2 vocabulary test. Children's lexical development was examined in two points in time, the first at grade 3 (aged 6-7) and the second at grade 5 (aged 8-9). The degree of L1 lexical reliance was measured through the cognate facilitation effect. The results revealed that L2 children from partial immersion schools outperformed their peers from early EFL schools on both the receptive and productive vocabulary knowledge. However, the difference between the two groups was greater for the productive than the receptive vocabulary test. When children's performance on cognates was examined, it was observed that both groups scored higher on cognates than non-cognate words. However, the partial immersion group showed a better performance on both cognates and non-cognates compared to the early EFL group. Lastly, L2 children showed a rapid lexical growth from grade 3 to grade 5, especially on their productive vocabulary knowledge.

Chapter 1: Introduction

In our globalised world, learning a foreign language is considered mandatory for people's educational and academic career. It is a matter of fact that an increasing number of people are learning a foreign language from a very young age and many educational programs around the world have inserted a second and even a third language in their curriculum. More and more parents choose a bilingual education for their children, starting even from kindergarten, as it is generally agreed that a foreign language is better acquired once it has been introduced from a very young age. According to the Critical Period Hypothesis (CPH), age plays a crucial role in Second Language Acquisition (SLA) as maturational constraints seem to negatively influence the process of learning a second or foreign language (Lenneberg, 1967). Birdsong (2005) has suggested that such maturational constraints do exist but affect different aspects of language in different ways. CPH is a matter of debate in second/ foreign language acquisition. Despite the controversy on this matter, it has been generally agreed that children learn significantly different from adults, relying less on consciously attained structures and more on implicit learning (DeKeyser, 2003).

There are many reasons why a second language (L2) has been inserted in many educational programs around the world. To begin with, learning a foreign language is highly associated with advanced academic performance and higher scores in achievement tests (Stewart, 2005). Apart from learners' academic skills, bilingualism has a positive effect on cognitive skills as well, since bilinguals are better able to control two (or more) languages depending on the target task. This is also known as the bilingual advantage and refers to the more effective executive and inhibitory skills bilinguals have compared to monolinguals (Bialystok, Peets, & Moreno, 2014; Bartolotti & Marian, 2011; Fortune, 2011). In addition, the type of educational program significantly affects the way a second or foreign language is acquired. The amount of exposure to the L2 is considered a significant predictor of learners' academic and cognitive skills. Learners following a highly intensive program in the second language (L2) have an advantage on general cognitive skills, compared to bilinguals following a less intensive program (Puric, Vuksanovic, & Chondrogianni, 2017).

The main interest of the current paper is the examination of the L2 lexical acquisition by children following two different educational programs. Our main focus is placed on children acquiring a second language at school and, from now on, we will use the term L2 learners or L2 children. The main characteristic of L2 children is that they start acquiring a second language after the first has been well established (Unsworth, 2013). In the forthcoming sections, there will be an overview of two different educational programs, that of partial immersion and early English as a Foreign Language (EFL) programs, along with their implications on second language acquisition. There will also be a presentation of some significant findings on the intensity of L2 exposure at school and its relation to language development. Finally, there will be an overview of some key concepts on L2 lexical acquisition and the way the first language influences the development of the L2 lexicon on L2 children.

1.2 Bilingual education

The term bilingual education has been used for programs where two languages are used as the medium of instruction. Different types of bilingual education have been introduced according to the intensity of the program and the age of L2 introduction. First, there are bilingual programs where the second language is added to the first and both languages are used as the medium of instruction for content subjects. This kind of bilingualism is called additive since the development of the first language is not affected by the implementation of a second one (Swain & Lapkin, 2005). On the contrary, subtractive bilingual programs aim at developing the L2 at the cost of the L1, usually shifting from minority to majority language. The reason why bilingual education, more specifically additive bilingual education, has gained ground in many countries the past decades could be attributed to the fact that bilinguals have shown outstanding academic performance in L2 courses and core subjects as well (Baker, 2006; Cummins, 2000; Thomas and Collier, 2002).

Many different bilingual programs have been established around the world, with the most well-known being that of immersion. Immersion programs were first introduced in Canada, where the need to incorporate two different languages in the curriculum was on the rise. The main reason was the multicultural characteristics of the classroom due to huge migration waves. In such programs, English and French are the two languages that are used as the medium of instruction. (Swain & Lapkin, 2005). A clear distinction should be made between total immersion, where the main language of instruction is the L2 for up to 100% of the time, and partial immersion, where there is approximately 50% of exposure in the L1 and 50% in the L2 (Swain & Lapkin, 2005).

1.2.1 *Partial immersion programs*

In current societies, the increasing need to incorporate a second language at schools has led to the implementation of an intensive bilingual program known as partial immersion. Such programs aim at introducing a second or foreign language from the very first grades of schooling, or even at kindergarten, for teaching content subjects. These programs are also characterised as intensive bilingual programs, since the second language is used as the medium of instruction for 30% to 50% of the time (Genesee, 1985). Additive bilingualism is a primary characteristic as the second language is added to the first through a content-based teaching. These programs mirror the subconscious and implicit way children learn their first language by approaching a communicative methodology in the classroom (Richards & Rodgers, 1986; Baker, 2006). More specifically, the focus is on the meaning and not on the form of the second language, aiming at an equal and mutual understanding of the content of core subjects, such as maths or geography. In addition, no grammatical features of the target language are explicitly taught in class, but they are rather presented implicitly, through the intensive exposure from the very first grades (Baker, 2006). It is therefore the amount of exposure to the second language that enhances its effective acquisition and not a grammar-based teaching.

Partial-immersion education has been recently examined on its effect on L2 acquisition and development. It has been generally found that children following partial-immersion programs reach higher levels of L2 proficiency when compared to children following mainstream educational programs, where the second language is taught explicitly, as a separate subject (Genesee, 1985, 2004). Genesee (2004) mentioned that children from partial immersion

education have shown better performance on their functional proficiency. In other words, learners in partial immersion education are better able to use the foreign language for communicative purposes, having little or no knowledge of its rules and regulations. Intensive exposure to the foreign language significantly enhances its acquisition, especially at higher levels, while the communicative approach used in the partial immersion classroom enables the functional use of the target language.

The intensity of L2 exposure at school has caused a great concern on the adequate development of the first language. Since the time of instruction has been equally distributed between two languages, L1 exposure will be decreased compared to mainstream schools. A number of studies, focusing on the academic performance of children from both partial immersion and mainstream schools, have shown that an extended exposure to a L2 can actually benefit academic performance on the first language as well (Cohen & Swain, 1976; Thomas & Collier, 2002; Stewart, 2005; Marian, Shook & Schroeder, 2013). Of great significance is children's outstanding performance on problem-solving courses, such as maths and writing (Marian et al., 2013; Tharp, Swenson & Mayne, 2018). Children in intensive bilingual schools are given the chance to map a single concept in both languages and, as a result, show better executive and cognitive skills compared to monolinguals. It can, therefore, be concluded that the acquisition of a second language benefits other linguistic and cognitive areas as well, while L1 development is not negatively affected by extensive L2 exposure.

1.2.2 Early EFL programs

Early English as a Foreign Language (EEFL) programs incorporate English lessons, from the first grade of school, where English is taught as a second language, reflecting the idea that children who are exposed to the second language from a very young age show a faster rate of linguistic development and can reach higher levels of proficiency in the L2. EEFL programs differ from partial immersion in the intensity and amount of exposure, since the L1 is the medium of instruction. However, the amount of L2 exposure varies depending on the demands of each school and society. Children who are exposed to a second language from the very first years of school, not only have they shown a comparable improvement in the L2 acquisition but they also have an outstanding performance on other academic areas in their L1 (Stewart, 2005; Goorhuis-Brouwer & Bot, 2010). Goorhuis-Brouwer & Bot (2010) examined the rate of English acquisition of Dutch children in bilingual schools where the amount of exposure varied from one to three hours per week. During the first year of English lessons, children's English comprehension skills were comparable to monolingual norms with an age equivalent of 2:5. Whether there is a threshold on the number of hours a L2 should be taught in order to be efficiently acquired is a rather complicated topic. Unsworth, Persson, Prinks, & de Bot (2014), addressing the relevance of length and intensity of exposure in the L2 at school, observed that children who had received more than 1 hour/ week of English lessons for two years, enhanced their English skills in a rate that is comparable to 5-month-old English monolinguals. On the contrary, less than 1 hour of L2 exposure/week was not sufficient for a significant improvement in the L2.

1.2.3 English language teaching in the Netherlands

In the Netherlands, teaching English as a separate subject in primary schools is obligatory since 1986 (Thijs, Tuin & Trimbos, 2011 cited in Gros, 2018)¹. More specifically, children are required to learn English in grade 7 (around the age of 10) or grade 8 (around the age of 11). In primary education, the hours spent for teaching English at school is around 30 to 45 minutes per week (Corda, Philipsen & de Craft, 2014, as cited in Gros, 2018). Nowadays, an increasing number of primary schools have inserted English lessons even from grade 1 (around the age of 4). Due to the increasing needs of our globalised world, a considerable number of Dutch schools are following a partial immersion or early EFL program as an attempt to examine the benefits of an early or intensive bilingual education in the Dutch society.

A significant number of primary schools have decided to start teaching English from the first grade and such programs are called ‘Vroeg Vreemde Talen Onderwijs’ (VVTO; early foreign language teaching, hereafter early EFL). The amount of time of English lessons is not the same for every program and varies from 15 to 60 minutes per week (Gros, 2018). Additionally, in 2016, partial immersion schools were implemented in the Dutch educational system as pilot programs, also known as TPO. These programs resemble partial immersion education and could be characterised as intensive bilingual programs. English is used as the language of instruction for approximately 15% of the total teaching time (3-4 hours per week) at the first grade.

Both partial immersion and early EFL schools are characterized as additive bilingual programs in the Netherlands. In both educational programs English is not taught as a separate subject, but it is incorporated into the teaching of content subjects. For this reason, the L2 learning is characterized as content-based, since L2 children are required to use the second language in a communicative way. It has been well established that the two programs considerably differ on the amount of L2 exposure. In most partial immersion schools, the language switch is set at clear points during the day, either at the beginning or towards the end of the school day. There are only a few schools where the two languages are used interchangeably throughout the day (Corda, Philipsen & de Craft, 2014). More information on the teaching methodologies applied at each school will be given in Chapter 2.

Partial immersion schools have recently been established in the Netherlands and little is known about their impact on second language acquisition. When compared with mainstream schools, early EFL students showed an advantage on their receptive vocabulary knowledge (Goriot, van Hout, Broersma, Lobo, McQueen, & Unsworth, 2019). However, whether the difference between partial immersion and early EFL schools would yield significant differences on children’s linguistic performance is a topic that needs further investigation. A project that measures children’s academic performance in Dutch and English in the Netherlands is the “*Frankered Onderzoek Tweetalig Onderwijs*” (FoTo) project. Three types of school are examined, partial immersion, early EFL and mainstream programs. The FoTo project keeps track of children’s linguistic development in Dutch and English along with their performance in mathematics, yielding crucial findings for children’s linguistic development in relation to the educational program they follow.

¹ Most of the articles about the educational system in the Netherlands and the pilot bilingual programs are written in Dutch since they have been recently established and a limited number of studies has examined their impact. I have, therefore, used information about these programs from Goriot’s (2018) PhD thesis and Gros’ (2018) MA thesis on the topic due to my limited knowledge of Dutch.

Of great significance in this paper is L2 children's lexical development depending on the educational program they follow. Whether the development of the lexicon in the second language is associated with the development of the L1 lexicon is a question that has yielded considerable results. A major finding of bilingual children following immersion and partial immersion programs is their increased cognitive skills. These skills are highly associated with language-inhibition and language-selection tasks. Bilinguals have the ability to control two languages when performing language specific tasks and this has been found to result in better problem-solving abilities. Bilinguals who are acquiring lexical items in the second language are expected to control the L1 and L2 lexicon in an effective way according to the task demands. The factors that influence the acquisition of L2 lexical items and the processes needed for interpreting these items in the mental lexicon will be extensively examined in the forthcoming section.

1.3 lexical acquisition

Central part in second language acquisition is the identification and production of words in the L2 since adequate lexical knowledge is a prerequisite for a grammatically, semantically and pragmatically appropriate language use. A question that has been extensively asked refers to the way lexical items are identified and accessed in an individual's mental lexicon. Two central processes are identified in lexical acquisition known as word identification or perception and word production (Dijkstra, 2005). Lexical perception refers to the ability to connect a specific lexical item to its concept. Word production refers to the process of identifying and producing the most appropriate lexical item according to the specific context.

Dijkstra (2005) has analysed the different stages required for the word perception and production processes. The first stage in the word perception process constitutes the linguistic input in which semantic, orthographic or phonological information are extracted. When specific phonemes or letter strings are presented, they subsequently activate word candidates that could be equally selected. At a later stage, the most appropriate word is selected by rejecting the potential word candidates. The target word is then linked with a specific concept that fits the specific semantic task. Additionally, word production is performed at three interrelated levels: the conceptual, the lexical, and the phonological level. First, at the conceptual level, semantic information is identified in order to be communicated. At the lexical level, specific lexical items are selected that lead to the phonological level, where the target phonemes are articulated (Costa, 2005). A different label for the aforementioned concepts is the top-down and bottom-up process of lexical access that is associated with lexical comprehension and production respectively.

1.3.1 Lexical development in L2 children

Of great significance in second language acquisition is the way lexical items are stored and activated in a bilingual's mind. For L2 children that process is considerably more demanding compared to monolinguals or simultaneous bilinguals, since they have already acquired a substantial number of lexical items in their L1 when they start learning the L2. L2 children have already mapped a specific concept to a word in the L1 and are expected to create equally strong links with the L2 lexicon in order to effectively communicate in the second language.

L2 children pass through different stages when they start developing their L2 lexicon. At an initial stage, the first links between the L2 word and its meaning are made. During that stage very simple linguistic properties of the word are acquired that enhance its comprehension rather than production. This process is also known as fast mapping (Carey, 2010; Lüke & Ritterfeld, 2014). Fast mapping can be established after little exposure to the L2 (Lüke & Ritterfeld, 2014). At a later stage, learners create stronger links between a word and its concept. This stage is also known as slow mapping (Carey, 2010; Lüke & Ritterfeld, 2014) and enables learners to not only comprehend but also appropriately use the L2 word. Slow mapping is expected to take place after a considerable exposure to the second language.

Another equally significant aspect in the development of the L2 lexicon is L2 speakers' ability to control more than one language. L2 learners are expected to select one language over the other depending on the communicative task. Since a word is linked to a concept, bilingualism presupposes the association of a single concept with two different words from two different languages. A frequently examined question is whether lexical items in the two languages are integrated or stored in separate lexicons. In relation to the debate of unified or separate lexicons, two hypotheses have been proposed; language selectivity and language non-selectivity theory (Kroll & Sunderman, 2003). Language selectivity refers to the cognitive ability of consciously inhibiting the activation of a lexical item in the non-target language, while language non-selectivity supports that both languages are active during a specific communicative task, even words from the language an individual does not intend to use (Navracics, 2007).

1.3.2 Cross-linguistic influence

As has already been mentioned in the previous section, a central question in bilingual's language development is whether two (or more) languages are acquired as independent systems or if they are influenced by cross-linguistic similarities (Serratrice, 2013; Müller & Hulk, 2001). Several studies have concluded that the two languages influence one another in language specific tasks, a phenomenon that is also known as cross-linguistic influence (CLI) or transfer. Bilingual speakers tend to use linguistic properties from one language in the production of the other. CLI is common among various language subsystems, such as morphology, semantics, pragmatics, and phonology. When the two languages have common linguistic properties, it is more likely for learners to rely on cross-linguistic similarities in order to effectively acquire a second language. Such cross-linguistic overlap can either accelerate or decelerate the development of a second language (Serratrice, 2013). L2 learners apply rules and structures from the more dominant language when learning a second/ foreign language, especially during the first stages of SLA. When the two languages follow similar linguistic structures, it is expected that the language acquisition process is accelerated, since learners are better able to identify and apply linguistic forms that have already been acquired in the first language. There are examples, though, where cross-linguistic overlap might inhibit the language acquisition process. For instance, partially similar structures might trigger linguistic aspects from the L1 whose appliance in the L2 might lead to the production of ungrammatical or awkward utterances.

An experimental approach taken to investigate the influence of cross-linguistic similarities in L2 lexical development is the examination of words with common semantic, orthographic, and phonological representations between the two languages. These words are commonly known as cognates and are expected to accelerate or enhance the L2 word learning process (Dijkstra, 2005; Poarch & Van Hell, 2012; Kelley & Kohnert, 2010; Lauro & Schwartz,

2017). For example, the word *book* in English and *boek* in Dutch have identical semantic and orthographic properties and very similar phonological representations between the two languages. The degree of overlap between the two languages is a significant predictor of general vocabulary knowledge and reading comprehension since cognates are expected to be identified and acquired faster than non-cognates (Casaponsa et al., 2015). In studies where the L1 was shown to influence L2 comprehension and use, the language non-selectivity hypothesis seems to be overtly supported, according to which both languages are active during the communicative process (Pérez, Peña & Bedore, 2010; Lauro & Schwartz, 2017; Sa´nchez-Casas Garcı´a-Albea, 2005).

1.3.3 *The cognate facilitation effect*

Cognates are translation equivalents with common orthographic and/or phonological features across two or more languages. Cognates have been used in a wide number of studies as words that are processed and used in a different way than translation equivalents that have no orthographic or phonological overlap. Through a variety of linguistic tasks, it has been shown that cognates are acquired more rapidly and accurately. Many factors seem to explain the effect cognates have on language acquisition. First, age at testing is a significant predictor, with older bilinguals being better able to identify cognates. A second factor is language dominance. The cognate effect is larger in the L2 than the L1, a fact that explains the reliance on the stronger language when acquiring a second one. (Lauro & Schwartz, 2016; Dijkstra, Van Hell & Brenders, 2015; Starreveld, De Groot, Rossmark & Van Hell, 2013). Another highly significant reason for the magnitude of the cognate effect in L2 learners' performance is L2 proficiency, with high-proficiency learners showing limited reliance on cognates.

Casaponsa et al. (2015) used a lexical decision task and examined whether reading comprehension skills were better predicted by the magnitude of the cognate effect between low- and high- proficiency learners. Although both groups identified cognates faster and more accurately, it was concluded that the cognate effect was a better predictor in the reading comprehension task for low-proficiency learners than the more proficient bilinguals. These results indicate that at lower levels, L2 learners rely more on cross-linguistic similarities in order to effectively comprehend the second language. Not only has the cognate effect been examined in isolated words, but cognates were also presented in sentences (Dijkstra et al., 2015; Starreveld et al., 2013). Although it was expected that the linguistic context would inhibit the activation of lexical items in the non-target language, a cognate effect was identified. Lauro and Schwartz (2016) suggest that the task itself plays a significant role in the magnitude of the cognate effect. When top-down activation is required (from meaning to form), the cognate effect is larger. This finding could also be explained by the difficulty of the word production process, compared to word comprehension (Costa, 2005). The more difficult the task is, the greater the need to rely on the more dominant language (Malabonga et al., 2008; Poarch & Van Hell, 2012; Kelley & Kohnert, 2010).

Although adult bilinguals have provided important information on the way cognates are processed and retrieved, the question that arises is whether children would identify and comprehend cognates in a similar way. It is generally accepted that children can identify cognates even at the early stages of SLA (Brenders, Van Hell, Dijkstra, 2011). However older bilingual children show a larger cognate effect. A possible explanation is the development of the first language over time which enhances the identification and acquisition of cognate words. Hemsley, Homm and Dodd (2013) examined the effect of phonological and conceptual lexical

distance on Samoan- English sequential bilingual pre-schoolers. In their study they included four categories of cross-linguistic word pairs; translation equivalents with no orthographic or phonological overlap, cognates, phrasal nouns and holonyms. Bilinguals were examined in both their receptive and productive skills during the first 18 months of school. A significant cognate advantage was only observed in the productive task, a fact that was explained by children's advanced receptive vocabulary skills. However, children's performance significantly improved as they became older. A significant finding here is that conceptual similarity between the two languages was a stronger predictor of word learning, highlighting the influence L1 has on L2 lexical acquisition. In relation, Malabonga et al. (2008) examined the cognate facilitation effect among Spanish- English bilinguals at grades 4 and 5. They observed that increased vocabulary knowledge in Spanish (L1) yielded a higher cognate effect and that children showed a higher cognate advantage at grade 5. As a result, L1 vocabulary knowledge significantly influences L2 lexical acquisition, especially for words with increased cross-linguistic similarities.

Poarch and Van Hell (2012) assessed the cognate effect among second language learners, highly proficient early bilinguals, monolinguals, trilinguals, and adults. All participants completed a picture-naming task in both the L2 and L1. Of primary importance are the results from the first two groups of bilingual children. L2 learners showed a significant cognate effect when they were naming pictures in their L2, indicating that their L1 was co-activated during that process. However, when they completed the task in their L1, the cognate effect was not significant². In contrast, early bilinguals who were highly proficient in both languages, showed a significant cognate effect when they were naming pictures in either their L1 or L2. It should be noted though that the magnitude of the cognate effect was smaller in the L1. Similarly, Brenders et al. (2011) conducted a longitudinal study on English-Dutch bilingual children, examining the cognate effect on both the first and the second language. They observed a significant cognate advantage for beginner and intermediate English learners when they were examined in the L2 and no significant cognate effect when the L1 was the target language. This result suggests that the dominant language (in this case the L1) is influenced less by cross-linguistic similarities. Moreover, in their study they found a significant relation of cognate processing and L2 proficiency, since the magnitude of the cognate effect decreased as the language proficiency increased. It can be concluded that as the proficiency in one language increases, cross-linguistic similarities do not enhance the SLA in a similar way to low-proficiency learners.

Language dominance is identified as a significant predictor of cross-linguistic interference. However, language dominance is difficult to conceptualise. Many studies operationalize exposure to either language as a measure for language dominance. Perez, Pena and Bedore (2010) examined English- Spanish bilinguals in a word identification task and categorised them into groups according to their exposure to each language (high Spanish exposure, balanced exposure, high English exposure) and their grade (young children, kindergarten, first graders). High Spanish exposure bilinguals performed better on cognates while high English exposure bilinguals performed better on non-cognates. Since the task was conducted in English it could be assumed that bilinguals with high exposure to the target language can inhibit the activation of lexical items in the non-target language. Likewise, Bosma, Blom, Hoekstra & Versloot (2016), examined Dutch-Frisian bilingual children at three points in time, aged 5-6, 6-7, and 7-8. Children were divided into three groups depending on

² In this study (Poarch & Van Hell, 2012) when L2 learners were naming pictures in the L1, the cognate effect was not significant in naming latency analyses and it was marginally significant in the error omission analyses.

their exposure to the target language: low, middle, and high exposure. Children with low exposure to the target language showed a greater cognate effect. Another significant aspect of this study is the way cognates were identified. Instead of a binary distinction between cognates and non-cognates, cognates were divided into identical, partially-similar, and non-cognates. From this distinction it was observed that the cognate facilitation effect gradually decreased over time. As they grew older, bilinguals performed better on items with a lower degree of cross-linguistic similarity.

Instead of giving cognates a binary code (cognate/ non-cognate), studies that operationalized cognates as a continuous variable have yielded significant results on the cognate facilitation effect. Dijkstra, Miwa, Brummelhuis, Sappelli, and Baayen (2010) included non-identical cognates in their study of Dutch-English bilingual children. Cognates were processed differently from completely dissimilar translation equivalents. More specifically, in a lexical decision task, as the similarity between lexical items increased the response time increased in a relative way. On the other hand, in a language decision task, increased cognate similarity yielded slower responses. In that way, cognates triggered the activation of both lexicons, making it more difficult for participants to decide which was the target language.

Of primary interest here is the study conducted by Goriot, Van Hout, Broersma, Lobo, McQueen, and Unsworth (2018). The cognate effect was examined through the Peabody Picture Vocabulary Test (PPVT-4), a standardized test that examines children's receptive vocabulary knowledge. The main focus was placed on the phonological similarity between translation equivalents in Dutch and English. Two groups of Dutch-English bilingual children were included according to the educational program they follow. One group followed mainstream education, where English is introduced at grade 7. The second group followed an early-English educational program, where English is introduced at grade 1. Two experiments were conducted measuring the difference in vocabulary scores between the two types of schools. The first experiment examined primary education students in three grades; grade 1 (4-5 years old), grade 5 (8-9 years old) and grade 9 (11-12 years old). The two groups differ significantly in the amount of exposure in English at school, with early-English students having received more hours of English lessons. The main results show that older children were better able to identify phonological similarities. Furthermore, children from early EFL programs scored higher in the PPVT test than mainstream-program students. However, the difference between the two types of school was larger among older children. A significant cognate effect was observed in both groups, independent of their age. To further investigate the cognate effect among older children, a second experiment was conducted with secondary-education students from three grades; first year (aged 12-13), second year (aged 13-14), and third year (aged 14-15) students. The same distinction between the type of education was made. Similar results were observed here, with bilingual-education children outperforming the mainstream-education children. The cognate effect was significant in both groups, although it was larger for older children.

In summary, bilinguals seem to rely on their first language when learning a second one and this phenomenon is observed in lexical acquisition with the use of cognates. Translation equivalents who have orthographic and/or phonological overlap between the two languages seem to be acquired faster and more accurately. However, the cognate effect seems to be larger among older children, primarily because they are in a higher grade at school and their skills in the first language have increased, allowing them to better identify lexical similarities between two languages. Age, language dominance, language proficiency, and exposure to the target language are factors that have been associated with the cognate facilitation effect. In general,

the faster and more accurate identification of cognates reveals that both languages are active during lexical decision or retrieval tasks. More specifically, lexical knowledge from the more dominant language accelerates the identification or retrieval of words in the weaker language.

1.3.4 Models of the bilingual lexicon

Several models have been proposed, explaining the lexical acquisition process in the second language. Some of these models seem to explain the different process of cognates. Two of them are of great significance to the current study. First are the word association and concept mediation models (Potter, Von Eckardt, & Feldman, 1984) that will be presented together. The second model that will be described here is the distributed feature model (De Groot, 1992).

The word association model (Potter et al., 1984) suggests that direct links connect lexical items in the L1 with their conceptual representation. However, at the early stages of L2 acquisition, no direct conceptual links are identified. L2 words are directly linked with their translation equivalents in the L1. In other words, access to the meaning of a lexical item in the L2 is achieved through L1 mediation. The concept mediation model is used to explain the lexical identification at later stages of SLA. More proficient L2 learners are better able to directly link lexical items in the L2 with the corresponding concept

Figure 1: Word association model

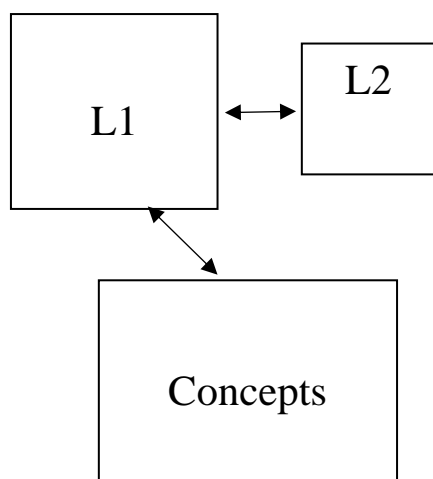
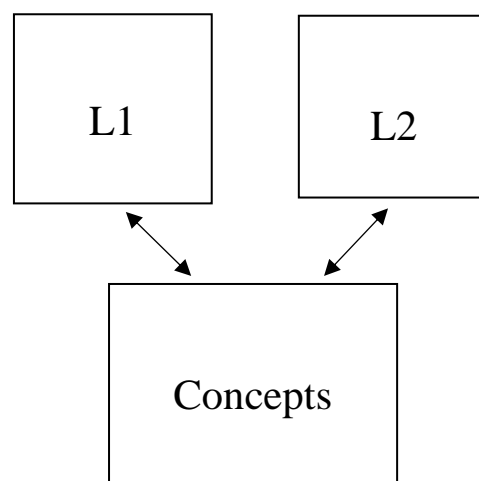


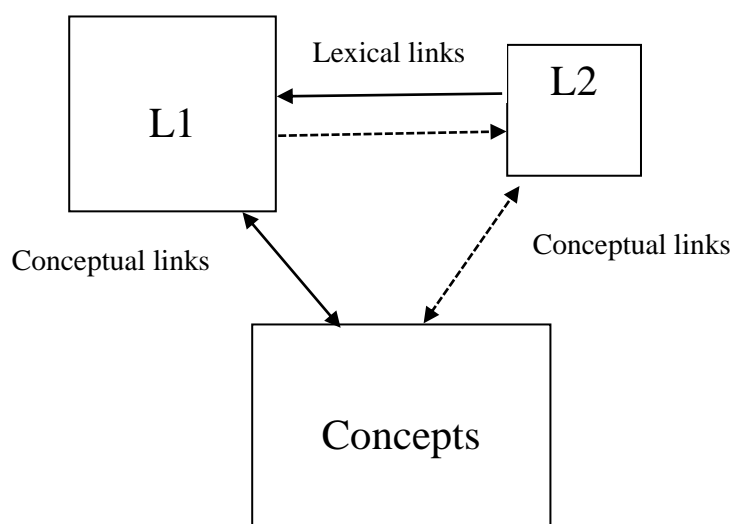
Figure 2: Concept mediation model



(Potter et al., 1984)

Kroll and Stewart (1990) proposed the Revised Hierarchical Model (RHM) that incorporates the word association and concept mediation model. A central concept of the RHM model is the asymmetric processing of lexical items in the second language. Different studies have examined the asymmetrical lexical processing in the two languages through word-translation (Kroll & Stewart, 1994) and picture-naming tasks. L2 learners were faster at translating words from the L2 to the L1 rather than the opposite direction, implying that there are stronger word associations from the L2 to the L1 (word association model), whereas translation from the L1 to the L2 requires conceptual mediation that affects the translation process (conceptual mediation model). It should be mentioned that the aforementioned models assume common conceptual representations of lexical items across languages.

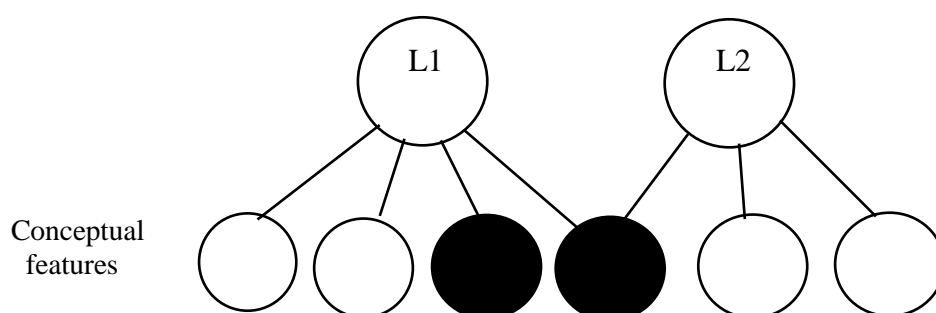
Figure 3: The Revised Hierarchical model (Kroll & Stewart, 1990)



A second model that explains the faster and more accurate processing of words with phonological, orthographic and semantic overlap across languages is the distributed feature model (de Groot, 1992). This model assumes that common semantic features are accessed from both the first and the second language. In addition, it is assumed that specific words are accessed in a different way depending on the degree of conceptual and lexical overlap. This model does not assume universal concepts, but rather universal conceptual features. A distinction is made between concrete and abstract words, according to which concrete words are more likely to have common conceptual representations than abstract words across languages. This assumption is also supported by Hemsley's et al (2013) study where conceptual distance was a stronger predictor of L2 word acquisition. Some concepts might be very similar across languages but might differ in some specific features, making it more difficult for L2 learners to link them with their translation equivalent in the second language. Concrete words share more conceptual features across languages compared to abstract words. In addition, similarities at the lexical level are added to the model by including translation equivalents with spelling and sound similarities across languages (cognates). It is concluded that concrete words and cognates are processed faster and more accurately. However, the current model fails to

account for the translation asymmetry between the two languages. This is due to the model's assumption that the semantic interpretation of a word is symmetrically connected to the first and the second language and as a result an equal amount of effort is expected for L1 to L2 and L2 to L1 translation.

Figure 4: The distributed feature model (de Groot, 1992)



It should be noted that the investigation of the cognate effect among children is quite limited. The cognate facilitation effect has been primarily examined among simultaneous or sequential bilinguals. Additionally, most studies have focused on language proficiency and age as predictors of the cognate effect and few have investigated the exposure in the second language according to the educational program received. Goriot's et al. study is among the few, at least to my knowledge, that has examined differences in lexical retrieval between mainstream and early bilingual schools. On the contrary, little is known about more intensive bilingual programs, such as partial immersion schools, and their impact on L2 lexical acquisition. Examining unbalanced bilinguals on their lexical processing and, more specifically, on the way cognates are identified and processed has significant implications on second language acquisition and is of great pedagogical value. First, a comparison between different types of schools can reveal whether significant differences are observed among L2 learners on their lexical development. Secondly, examining intensive L2 exposure at school on children's lexical development can enhance our picture on the role of exposure in general on unbalanced bilinguals. On top of that, significant information about early EFL and partial immersion will be given, an implementation of which could lead to a more beneficial acquisition of a second language.

1.4 Research questions

The current study seeks to examine the role different second language programs have on receptive and productive lexical tasks. More specifically a comparison between partial immersion and early EFL programs in the Netherlands will be made. Secondly, the relation between exposure to the L2 at school with L1 reliance in receptive and productive lexical skills will also be examined over time, at grade 3 and 5. In order to investigate whether there are any differences between the two groups in vocabulary knowledge, the main research questions will be formed as follows:

- 1) To what extent do L2 children in partial immersion and L2 children in early EFL schools differ in their receptive and productive lexical knowledge of English?
- 2) To what extent do L2 children in partial immersion and L2 children in early EFL schools use their L1 lexical knowledge in receptive and productive lexical tasks, as measured by the cognate facilitation effect?
- 3) To the extent that any differences are observed between L2 children in partial immersion and L2 children in early EFL schools, are these constant over time?

1.5 Hypotheses

With respect to the first research question, we predict similar results to Goriot's et al. (2018) study, that is L2 children from the partial immersion school will outperform L2 children from the early EFL school on receptive and productive vocabulary test. We also expect that both groups would have a better performance on the receptive than the productive vocabulary test as was also the case in Hemsley's et al. (2012) study.

With respect to the second research question, the degree to which L2 children make use of the L1 vocabulary knowledge will be examined with the cognate facilitation effect. It is expected that both groups will show a significant cognate effect and will produce more accurate answers on words that have a significant semantic and phonological overlap with their native language (Dutch). This means that when we compare the percentage of correct responses on cognates and non-cognates, more accurate responses will be observed on cognate words. Our third hypothesis suggests that the cognate effect will be larger at the receptive than the productive vocabulary test. We assume that L2 children have an increased receptive vocabulary knowledge and this will enable them to better identify cognates. Our fourth hypothesis assumes that learners from the partial immersion program will produce more accurate answers on non-cognates than early EFL learners. The primary reason for this hypothesis is that learners from the partial immersion programs are more experienced in the second language due to the intensive L2 exposure. In other words, we hypothesize that intense exposure to a second language enhances the SLA process and L2 children from partial immersion schools will rely less on their L1 lexical knowledge.

With respect to the third research question, at grade 5 (aged 8-9), we assume that both groups would show a rapid vocabulary growth as a result of their intensive L2 exposure. An explanation for this hypothesis is that, after two years of L2 exposure at school, L2 children from both groups would have significantly enhanced their L2 receptive and productive vocabulary skills. We also expect to find the same differences between the two groups on their receptive and productive vocabulary performance at grade 5. More specifically, we assume that

the partial immersion group would have a better performance on both the receptive and productive vocabulary tests, compared to the early EFL group. It is also expected that participants from both groups will show a significant cognate effect and its magnitude will be larger at grade 5 compared to the results from grade 3, as was also observed in Goriot's et al. (2018) study.

Chapter 2: Methodology

For the current study, previously collected data will be used from the ‘Flankerend Onderzoek Tweektalig Onderwijs’ (FoTo) project. This is a longitudinal study that examines the academic development of Dutch children from a nationwide pilot on partial immersion education. Data from three types of school were collected: 12 Dutch-English partial immersion schools, also called TPO (*tweektalig primair onderwijs*, which stands for bilingual primary education, hereafter partial immersion), 12 early EFL schools, named VVTO (*vroeg vreemde talen onderwijs*, which stands for early English as a foreign language education, hereafter early EFL) and 9 mainstream schools, known as ‘eibo’ (*Engels in het basisonderwijs*, which stands for ‘English in primary education’). The FoTo project evaluated children’s academic skills in both Dutch and English along with their mathematical skills. There were three rounds of testing, the first at grade 1 (aged 4-5) in 2015, at grade 3 (aged 6-7) in 2017, and at grade 5 (aged 8-9) in 2019. For the current study data from partial immersion and early EFL schools will be analysed at grades 3 and 5.

2.1 Partial immersion and early EFL schools

Data from partial immersion and early EFL schools have been collected and will be examined according to children’s performance on receptive and productive vocabulary knowledge. Partial immersion and early EFL schools differ significantly in the amount of time English is used as the medium of instruction. At grade 3, the 12 partial immersion schools from the FoTo project used English as the main language of communication for approximately 364 minutes per week which is equal to 24% of the total teaching time and ranges from 16% to 60%. Early EFL schools offer an average of 124 minutes of English instruction which is equal to 8% of the total teaching time and ranges from 2% to 13% (Driessen, Krikhaar, de Graaff, Unsworth, Leest, Coppens & Wierenga, 2016; as cited in Gros, 2018).

For the partial immersion schools, teachers were evaluated on their level of proficiency in English through vocabulary tests. They were also asked to complete self-reports rating their level of proficiency. Results showed that they were near native, and native English speakers and according to the guidelines provided by the Common European Framework (CEFR) (Council of Europe, 2001) their level of proficiency ranges from independent English user (B1/B2) to proficient English user (C2). Different teaching methodologies were applied in each school, with six partial immersion schools following the *one teacher, one language* method (OTOL) according to which one teacher uses Dutch during the lesson and a different one is used for the English courses. Four schools follow the *one situation, one teacher* method (OSOL), according to which the same teacher would be used for either Dutch or English courses at specific times during the day. Finally, two schools apply the *Sandwich* method in which both languages were used interchangeably throughout the day, independent of teacher or situation (Driessen et al., 2016). Table 1 shows all the relevant information about teachers’ level of proficiency and the teaching methodologies applied in each school.

Table 1: Teachers' language background and level of proficiency based on the CEFR guidelines in partial immersion education and the teaching methodology applied for each school.

TPO-school	Language background	Self-assessment	Vocabulary size test	Teaching methodology
Partial immersion -1*	Near native	C2	C1	OSOL
Partial immersion -2*	Near native	B2/ C1	C1	Sandwich
Partial immersion -3	Near native	C2	C1	OTOL
Partial immersion -4*	Non-native	B2/C1	C1	Sandwich
Partial immersion -5	Non-native	B1	C1	OSOL
Partial immersion -6*	Native speaker	C2	C2	OTOL
Partial immersion -7*	Native speaker	C2	C2	OSOL
Partial immersion -8	Native speaker	C2	C2	OTOL
Partial immersion -9*	Native speaker	C2	C2	OTOL
Partial immersion-10*	Native speaker	C2	C2	OTOL
Partial immersion-11*	Near native	C2	C1	OTOL
Partial immersion-12*	Near native	C2	C2	OSOL

1. Schools with asterisk are the ones who were analysed in the current study

2. Teaching method: OSOL (One teacher, one language method, OTOL (one condition, one language method), Sandwich (one teacher/ situation, two languages). Both Dutch and English were used at school in all situations

Note: Taken from Driessen, Krikhaar, de Graaff, Unsworth, Leest, Coppens & Wierenga, 2016

2.2 Participants

For the current study 9 partial immersion and 8 early EFL schools from the FoTo project were examined. A parental questionnaire was distributed and completed by the caregivers at the second round of examination (grade 2, Spring 2017). Response rate of the parental questionnaire at grade 2 was 55% for tpo schools and 75% for vvto schools. From the parental questionnaire significant information on children's age, socioeconomic status (SES), language and educational background was collected.

Our two groups would primary differ according to the type of education they receive. For this reason, we tried to control for external factors that would have a potential effect on our results, such as age and SES. It has been shown that SES significantly affects the rate and quality of first and second language acquisition, since children with a high-SES have shown a considerable linguistic and cognitive advantage (Naeem, Filippi, Periche-Tomas, Papageorgiou, & Bright, 2018). SES was measured through the maternal and paternal educational level. We identified three categories: primary, secondary, and higher education. Since we had a low rate of response for L2 children's SES, we conducted a chi-square test among all participants in the FoTo project from partial immersion and early EFL schools, in order to investigate whether there was a significant relation between the types of schools and participants' SES. More specifically, we ran two chi-square tests, one for the maternal and one for the paternal SES. There was no significant associations between maternal SES and type of school $\chi^2(2) = 3.51, p > .05$. There were also no significant association between paternal SES and type of school, $\chi^2(2) = 4.5, p > .05$.

From these children, 50 Dutch (L1)- English (L2) early English language learners were randomly selected and examined. Half of them followed a partial immersion program (n=25,

12 girls and 13 boys) and the other half an early EFL program (n=25, 11 girls and 14 boys). All participants were native Dutch speakers and the language used at home was Dutch from guardians and siblings alike. In order to investigate whether the two groups significantly differed in their age, we ran an independent t-test. L2 children from early EFL schools were older (M= 82.36 months, SE= 1.11) than L2 children from BPE schools (M= 80.28 months, SE= .725). This difference, -2.08 BCa 95% CI [-4.8, .592] was not significant, $t(48) = -1.56$, $p = .118$, $d = 0.37$.

Both groups are learning English as a second language and the main difference is the amount of exposure to English at school. In grade 3 (aged 6-7), participants from the partial immersion program received an average of 31.4% of English instruction during a week, while the ones from the early EFL program received an average of 12% of English instruction. Participants were selected from approximately every school in the FoTo project in order to avoid differences in the type of teaching method used in each school. All three teaching methodologies (OSOL, OTOL, Sandwich) were included in our sample of partial immersion schools. Table 2 presents the number of participants in each of the schools that have been selected in the current study along with the percentage of English instruction per week in grade 3.

Table 2: Number of participants in the current study with the minutes of English lessons per week at grade 3 and the percentage of English instruction per week for each school (partial immersion and early EFL).

School	Number of participants	Minutes/ week	% of English instruction
Partial immersion_1	2	900	60%
Partial immersion_2	3	515	34%
Partial immersion_4	4	405	27%
Partial immersion_6	4	240	16%
Partial immersion_7	3	525	35%
Partial immersion_9	4	285	19%
Partial immersion_10	2	510	34%
Partial immersion_11	2	525	35%
Partial immersion_12	1	345	23%
Partial immersion_ total	25	472.2	31.4%

School	Number of participants	Minutes/week	% of English instruction
Early EFL_2	4	90	6%
Early EFL_4	4	195	13%
Early EFL_6	3	60	4%
Early EFL_7	1	120	8%
Early EFL_9	4	180	12%
Early EFL_10*	4	-	-
Early EFL_11	4	90	6%
Early EFL_12	1	30	2%
Early EFL_ total	25	≈ 109.3	≈ 7.3%

*Note: For early EFL-10 school we were not provided with the exact amount of time of English instruction.

2.3 Materials

Peabody Picture Vocabulary Test (fourth edition)

The Peabody Picture Vocabulary Test (PPVT-4; Dunn & Dunn, 2007) is a standardised test that measures the receptive vocabulary knowledge. It is a user-friendly test that can be effectively used with very young children. In total, it consists of 228 items which are placed in order of difficulty (from the most to least frequent words). During the task, participants listen to a word and choose one out of the four presented pictures that best describes the meaning of the word. Participants are examined individually and each session lasts for approximately 15-20 minutes. A session is finished once participants reach the ceiling set, which is the one with at least eight mistakes. The basal set is identified when participants have made no more than one mistake in a single set. The difficulty of the items for each participant is controlled according to participants' responses. If a set is considerably more difficult for an individual, which means that more than two mistakes are made, an easier set is provided.

Expressive Vocabulary test (second edition)

The expressive vocabulary test, second edition (EVT-2; Williams, 2007) is a standardised test that measures the expressive vocabulary knowledge. It is designed to coordinate with PPVT-4. Similarly to PPVT-4 test, EVT-2 is user friendly and appropriate for very young learners. During the test, participants are presented with one picture and are asked to orally produce a word related to the picture. For example, the child is presented with a picture of a sad boy. The researcher will ask the child "*how does the boy feel?*" and the expected answer is *sad*. There are occasions where more than one word would be accepted as correct, when the same concept is being described (e.g. synonyms). The tool consists of 190 items which are presented in order of difficulty. Each session lasts for approximately 10-20 minutes.

2.4 Procedure

All participants were examined individually for both the receptive and productive vocabulary skills. The examination took place at children's schools. The same participants were tested with the PPVT-4 and the EVT-2 in grade 3 (aged 6-8) and grade 5 (aged 9-10). In that way, comparisons can be made on children's vocabulary knowledge according to the type of education they have received and the rate of development from group 3 to 5. Each session lasted approximately 15 to 20 minutes.

2.5 Operationalising cognate status: Phonological similarity

Cognates were identified according to their phonological similarity between Dutch and English. We examined the phonological and not the orthographic similarity of translation equivalents because participants were required to identify or produce the target words orally and no orthographic representation of the words was given during the examination. In order to examine the degree to which the English and Dutch words were phonologically similar we calculated the normalised Levenshtein's distance (LD), following Goriot's et al (2018) and Schepens' et al (2013) studies. The first step was to translate all the items in the PPVT-4 and the EVT-2 tests in Dutch. Dutch translations were selected according to two criteria: they should describe the presented picture and they should be the closest translation of the English words. Three native Dutch speakers (University students, following a master program in general linguistics at the Radboud University) rated the degree to which Dutch words met these two criteria and provided a Dutch translation of the English words. We used the Longman online dictionary for the phonological transcriptions of the English words and the Heemskerck and Zonnenveld (2000) dictionary for the Dutch words. All words were then transcribed into XSAMPA for Levenshtein's distance to be calculated.

Levenshtein's phonological distance is measured by the minimum number of steps needed to transform one word into the other. More specifically, we calculated the number of phoneme deletions, substitutions and insertions needed. For example, the transcription of the word *drip* in English is /drip/ and its Dutch translation equivalent *druppel* can be transcribed as /drYp@l/. The phonological distance between these words is 3 since we need to substitute the phoneme /i/ with /Y/ and insert the phonemes /@/ and /l/. The normalised distance can be calculated by dividing a word's phonological distance by the length of the longest word, either the Dutch or the English. We can then subtract the normalised distance from 1 in order to get the phonological similarity:

$$PhonSim = 1 - \frac{distance}{length}$$

According to the previous example the phonological similarity between /drip/ and /drYp@l/ is 0.5. The Dutch word is the longest one, with six phonemes. Levenshtein's phonological similarity is represented as follows:

$$PhonSim = 1 - \frac{3}{6} = 0.5$$

Levenshtein's phonological similarity can take values from 0 to 1, where 0 means that the two words are completely dissimilar and 1 that they are phonologically identical.

We operationalized cognates as a categorical variable, identifying words as cognates or non-cognates. The cut-off point was set at .5 of Levenshtein's phonological similarity. that means that in our analyses cognates were phonologically identical or partially similar translation equivalents. We decided to include partially similar words as cognates because of the way participants were tested. The words in the two vocabulary tests were examined orally. It is rare to find phonologically identical words across languages since different variants of the same phoneme might be used in different languages. These variations were identified as cross-linguistic differences when the phonological similarity was calculated. However, we assume that specific allophones are easy to be identified during sound comprehension and can be matched with the equivalent allophone in the L1. We, therefore, assume that even partially similar words, with regards to phonology, would be easy for children to identify, especially

during the receptive vocabulary tasks. A more detailed presentation of the percentage of cognates answered by each group at each vocabulary test at grades 3 and 5 will be given in Chapter 3.

2.6 Analysis

For the examination of the main research questions of this study we compared the results from the PPVT-4 and EVT-2 between the partial immersion and early EFL schools. Participants' lexical development was examined over time, at grade 3 and grade 5. We also investigated the degree of reliance on the first language by measuring the magnitude of the cognate effect at each test and each grade. Results were analysed with the statistical program SPSS 2.0.

For these purposes, a three-way repeated measures analysis of variance (RM ANOVA) was conducted with school type (partial immersion vs early EFL), time (grade 3 vs grade 5), test type (PPVT vs EVT), and cognate status (cognates vs non-cognates) as the independent variables, while scores at each vocabulary test were identified as the dependent variable. School type is a categorical, between-subjects variable while time, test type, and cognate status are binary, within-subjects variables. Since three of the independent variables are within-group measures, repeated-measures ANOVA is the desirable analysis as it increases the power of the test (Larson-Hall, 2016). With this analysis we can estimate the magnitude of the cognate effect for each type of school on both tests at grade 3 and grade 5.

The vocabulary tests used here are designed as such that not all children answered the same number of lexical items for each test. In order to measure L2 children's performance, we calculated the percentage of total correct responses, including cognate and non-cognate words, the percentage of correct responses on cognates, and the percentage of correct responses on non-cognates for the PPVT and EVT vocabulary tests at grades 3 and 5. More details on the percentage of answered items will be given in Chapter 3.

With respect to the first research question, we focused on the percentage of correct responses on all items, including cognates and non-cognates. In order to answer the second research question about the cognate facilitation effect, we measured the magnitude of the cognate effect per group and per vocabulary test. The third research question asked whether the results observed at grade 3 would remain constant at grade 5. The inclusion of time in the analysis as a within-subjects factor would give significant information on children's L2 lexical development over time.

Chapter 3: Results

The central focus of the current study is the examination of L2 children's receptive and productive lexical development and the degree to which they rely on their L1 vocabulary knowledge. Receptive vocabulary knowledge was tested with the PPVT-4 test and productive vocabulary knowledge was examined with the EVT-2 test. Reliance on L1 vocabulary knowledge is measured through the cognate facilitation effect. We identified translation equivalents with phonological similarity and examined L2 children's performance on these words. The children who participated in the current study were divided into two groups according to the educational program they follow at school. The two types of school included here were partial immersion and early EFL. In order to examine the main research questions of this study we compared children's performance on the receptive (PPVT-4) and productive (EVT-2) vocabulary tests. Children's performance was examined longitudinally, the first at grade 3 and the second at grade 5. Therefore, we could track children's vocabulary growth over time. We conducted a repeated-measures ANOVA with type of test (PPVT vs EVT) time (grade 3 vs grade 5), and cognate status (cognates vs non-cognates) as the within-subject factors and type of school (partial immersion vs early EFL) as the between-subjects factor. We review here the research questions of the present paper:

- 4) To what extent do L2 children in partial immersion and L2 children in early EFL schools differ in their receptive and productive lexical knowledge of English?
- 5) To what extent do L2 children in partial immersion and L2 children in early EFL schools use their L1 in receptive and productive lexical knowledge as measured by the cognate facilitation effect?
- 6) To the extent that any differences are observed between L2 children in partial immersion and L2 children in early EFL schools, are these constant over time?

In the subsequent sections we present the results on PPVT and EVT for each type of school. First, there is a presentation of children's overall performance at grade 3 and 5, where both cognates and non-cognates are included in the analysis. Then, we examined the magnitude of the cognate effect for each group, at each time of testing and for each test.

3.1 Overall performance on receptive and productive vocabulary tests

With respect to the first research question, we compared L2 children from partial immersion and early EFL schools on the percentage of total correct responses on PPVT-4 and EVT-2 at grades 3 and 5. Table 3 presents the mean scores for each group at each test and at each grade. The mean scores for each group at both test moments is given for the PPVT at Figure 5 and the EVT at Figure 6. Figures 7 and 8 show the vocabulary growth over time for the PPVT and EVT vocabulary tests respectively

Table 3: mean percentage of correct responses on receptive and productive vocabulary tests for each type of school at grades 3 and 5. Standard mean error is presented in brackets.

<i>Scores on receptive and productive vocabulary tests</i>				
<i>School</i>	<i>Test</i>	<i>N</i>	<i>Grade 3</i> <i>M (SE)</i>	<i>Grade 5</i> <i>M (SE)</i>
<i>Partial Immersion</i>	PPVT	25	61.57 (1.17)	64.82 (1.51)
	EVT	25	45.09 (3.1)	54.83 (2.91)
<i>Early EFL</i>	PPVT	25	56.79 (1.17)	60.37 (1.51)
	EVT	25	29.14 (3.1)	38.45 (2.9)

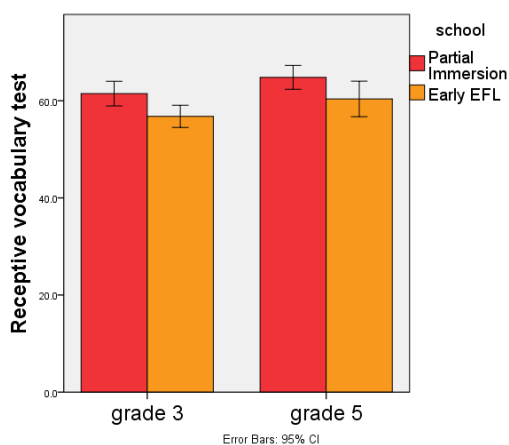


Figure 5: Mean percentage of overall correct responses on the receptive vocabulary test (PPVT-4) at grades 3 and 5.

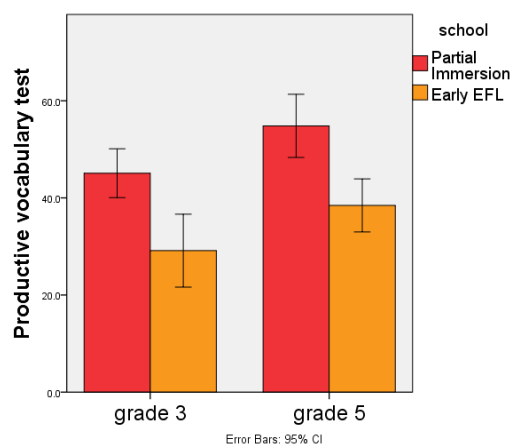


Figure 6: Mean percentage of overall correct responses on productive vocabulary test (RVT-2) at grades 3 and 5.

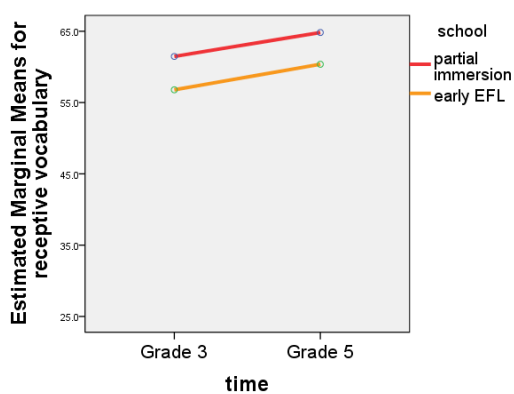


Figure 7: Growth of receptive vocabulary knowledge for each type of school from grade 3 to 5.

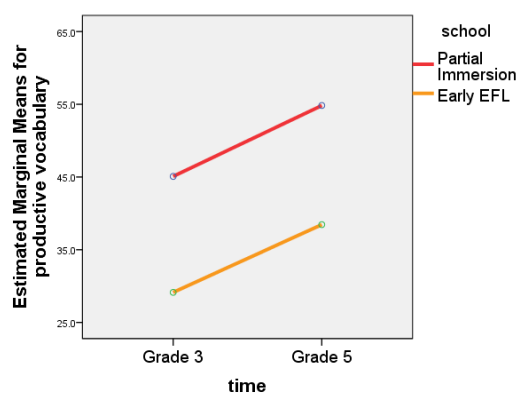


Figure 8: Growth of productive vocabulary knowledge for each type of school from grade 3 to 5.

What these figures show is that considerable differences were observed between the two groups on their overall performance at the two vocabulary tests. More specifically, at grade 3 the partial immersion group had more correct answers on the PPVT test ($M= 61.47$, $SE= 1.23$) compared to the early EFL group ($M=56.79$, $SE= 1.11$). However, the difference between the two groups was bigger for the EVT test, with the partial immersion group scoring significantly higher ($M= 45.09$, $SE= 2.4$) than the early EFL group ($M= 29.14$, $SE= 3.6$). At grade 5, children's performance on PPVT and EVT tests resembles the results from grade 3. At the PPVT test, the partial immersion group had higher scores ($M=64.82$, $SE= 1.19$) compared to the early EFL group ($M= 60.37$, $SE= 1.77$). The difference between the two types of school was again larger for the productive vocabulary test, with the partial immersion group having more accurate responses ($M= 54.83$, $SE= 2.91$) than the early EFL group ($M=38.45$, $SE= 2.91$).

A mixed ANOVA was conducted to show all significant main effects and interactions for the first research question. First, there was a significant main effect of school, $F(1, 48) = 17.523$, $p < .001$, $\eta^2=.267$, indicating that there were significant differences between the two types of school on their overall performance. Children from partial immersion schools had significantly more correct responses ($M= 56.55$, $SE= 1.75$) than children from early EFL schools ($M= 46.189$, $SE= 1.75$). There was a significant main effect of test $F(1,48) = 157.7$, $p<.01$, $\eta^2 = .767$, indicating that participants from both types of school performed significantly different between the two types of tests. More specifically, more correct responses were observed on the receptive vocabulary test (PPVT) ($M=60.86$, $SE= 0.74$) than the productive vocabulary test (EVT) ($M= 41.88$, $SE= 1.91$). There was also a significant main effect of time, $F(1,48) = 32.48$, $p < .001$, $\eta^2=.404$, according to which there were significant differences on children's performance from grade 3 to grade 5. L2 children had more correct responses at grade 5 ($M= 54.62$, $SE= 1.4$) than at grade 3 ($M= 48.12$, $SE= 1.32$), indicating that their overall vocabulary knowledge improved over time.

A significant interaction between type of school and type of test was also observed, $F(1, 48) = 14.703$, $p < .001$, $\eta^2 = .234$, showing that the differences between the two groups on their overall performance differed per test. The difference between partial immersion and early EFL schools is greater for the productive vocabulary test (EVT) with L2 children from the partial immersion group having significantly more correct responses ($M= 49.96$, $SE= 2.7$) than L2 children from the early EFL group ($M = 33.79$, $SE = 2.7$). For the receptive vocabulary test (PPVT), the partial immersion group had again more accurate responses ($M= 63.15$, $SE= 1.04$) than the early EFL group ($M = 58.58$, $SE = 1.04$). However, the difference was smaller for the PPVT test. In addition, we also observed a significant interaction between test and time, $F(1,48) = 8.14$, $p = .006$, $\eta^2 = .145$, indicating that the rate of lexical development from grade 3 to 5 was different for each type of test. More specifically, at PPVT-4, L2 children had significantly less correct responses at grade 3 ($M= 59.13$, $SE= .83$) than grade 5 ($M=62.6$, $SE= 1.07$). At EVT-2 a similar pattern is identified from grade 3 ($M=37.11$, $SE= 2.19$) to grade 5 ($M= 46.64$, $SE= 2.06$). However, the lexical growth is greater for the productive (EVT) compared to the receptive vocabulary test (PPVT).

No significant interaction was observed between time and school, $F(1,48) = .002$, $p=.966$, $\eta^2=.000$, indicating that children's performance from both types of schools did not change in a significantly different way from grade 3 to 5. In other words, L2 children from both partial immersion and early EFL schools had a better performance at grade 5 and the rate of progress was not significantly different between the two groups. In conclusion, there was not a significant interaction among type of test, type of school, and time, $F(1, 48) = .024$, $p = .878$, $\eta^2 = .000$.

In summary, significant differences were observed between the two types of school on their overall performance at the receptive and productive vocabulary tests. L2 children from partial immersion schools had generally a better performance than L2 children from early EFL schools on both the PPVT and EVT tests. However, the difference was greater for the productive vocabulary test. Both groups had more accurate responses on the receptive rather than the productive vocabulary test and this difference is present in both grades 3 and 5. Finally, both groups performed better at the second round of testing (grade 5). However, their lexical growth was bigger for the productive rather than the receptive vocabulary test.

3.2 Cognate facilitation effect

In order to answer the second research question, we examined the degree to which children made use of their L1 lexical knowledge in the perception and production of L2 lexical items. Reliance on L1 lexical knowledge was measured with the cognate facilitation effect. More specifically, additional analysis was conducted on Dutch-English translation equivalents with phonological overlap. A mixed ANOVA showed whether there were differences between L2 children from partial immersion and early EFL schools on the magnitude of the cognate effect at both times of testing. A mixed ANOVA was conducted, including test (PPVT vs EVT), time (grade 3 vs grade 5) and cognate status (cognates vs non-cognates) as within-subjects factor and school as the between-subjects factor.

3.2.1 *Conceptualisation of cognates*

Cognates were identified according to their semantic and phonological similarity. As was mentioned on Chapter 2 (section 2.5), the phonological similarity between translation equivalents was measured by calculating Levenshtein's phonological distance. The result could take values from 0 to 1, where 0 means that the two cognates are phonologically dissimilar, while 1 that they are identical. From the words included here very few were phonologically identical between Dutch and English. The criterion for selecting the cognate words was that the phonological similarity had a value of $\geq .5$. We selected .5 as a cut-off point because even partially similar words were expected to be easily identified by L2 learners, especially during the receptive vocabulary test. It has been shown that cognates with not a high degree of phonological similarity can indeed be identified and produced by L2 children and can be used as evidence of L1 lexical reliance (Malabonga et al., 2008). Secondly, the inclusion of cognates with a phonological similarity of $\geq .5$ could reveal significant information on the way cognates are used on each vocabulary test, since it has been suggested that partially similar cognates are easier to be identified at receptive rather than productive lexical tasks (Hemsley et al., 2012).

On average, from all the items on the PPVT test ($n = 189$) the mean phonological similarity was $M = .23$ ($SE = .02$, min. value at .0, max. at .8). Of all the items on the EVT vocabulary test ($n = 50$) the mean phonological similarity was $M = .33$ ($SE = .03$, min. value at .0, max. at .1).

At grade 3, the mean percentage of cognates answered at the PPVT was $M = 30.3$ ($SD = .37$) while for the EVT test was $M = 59.6$ ($SE = .91$). At grade 5 the mean percentage of cognates for the PPVT was $M = 30.9$ ($SE = .42$) and for the EVT was $M = 56.25$ ($SE = 1.07$). The number of cognates answered per test differed between the two groups. Table 4 shows the mean percentage of cognates answered per group for each test at each time of testing. The table shows that the two groups had approximately an equal number of answered cognates for each test, while no significant differences were observed from grade 3 to grade 5. The number of cognates answered by the L2 children is considerably larger for the productive (EVT) than the receptive vocabulary test (PPVT). The main reason for this observation is the significantly fewer lexical items included in the EVT test ($n = 50$) compared to the PPVT ($n = 189$).

Table 4: Mean percentage of cognates answered per group for each type of test at grades 3 and 5. Standard mean error in brackets.

		Mean percentage of answered cognates	
<i>School</i>	<i>Test</i>	Grade 3 <i>M (SE)</i>	Grade 5 <i>M (SE)</i>
<i>Partial Immersion</i>	PPVT	31.59 (.5)	32.22 (.6)
	EVT	58.32 (1.5)	52.26 (1)
<i>Early EFL</i>	PPVT	29 (.4)	29.62 (.5)
	EVT	60.84 (1.1)	60.24 (1.5)

3.2.2 The cognate effect

Overall, L2 children from both types of school had more correct responses on cognates ($M = 63.61$, $SE = 1.23$) than non-cognates ($M = 41.06$, $SE = 1.36$). Figures 9 through 12 show the mean percentage of total correct responses, correct responses on cognates and non-cognates per group for the PPVT and EVT vocabulary tests at grades 3 and 5. Rate of vocabulary growth on cognates from grade 3 to 5 is given for the PPVT at Figure 13 and EVT at Figure 14. Rate of vocabulary growth on non-cognates from grade 3 to 5 is given for the PPVT test at Figure 15 and for the EVT test at Figure 16.

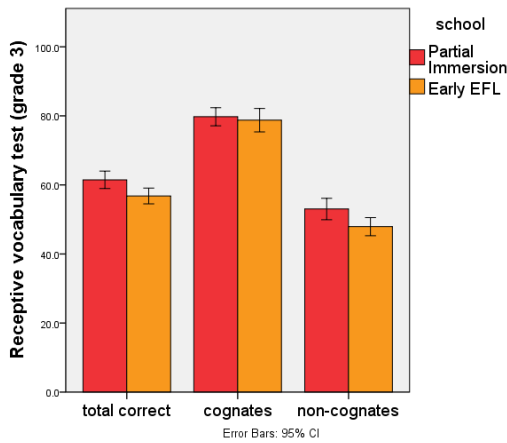


Figure 9: Mean percentage of total correct responses, correct responses on cognates and non-cognates on the receptive vocabulary test at grade 3.

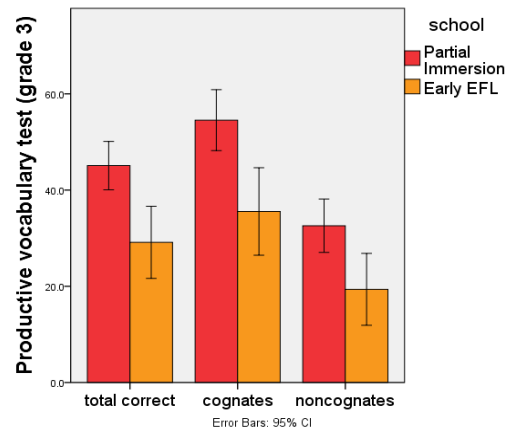


Figure 10: Mean percentage of total correct responses, correct responses on cognates and non-cognates on the productive vocabulary test at grade 3.

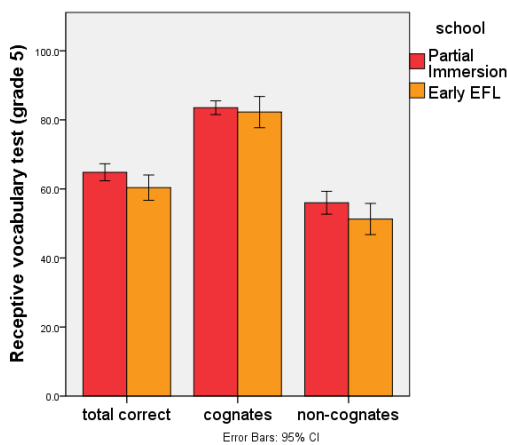


Figure 11: Mean percentage of total correct responses, correct responses on cognates and non-cognates on the receptive vocabulary test at grade 5.

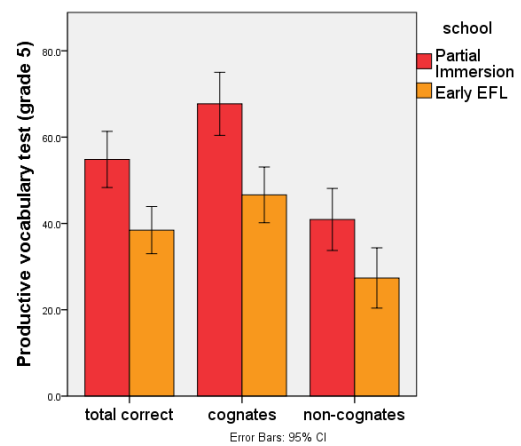


Figure 12: Mean percentage of total correct responses, correct responses on cognates and non-cognates on the productive vocabulary test at grade 5.

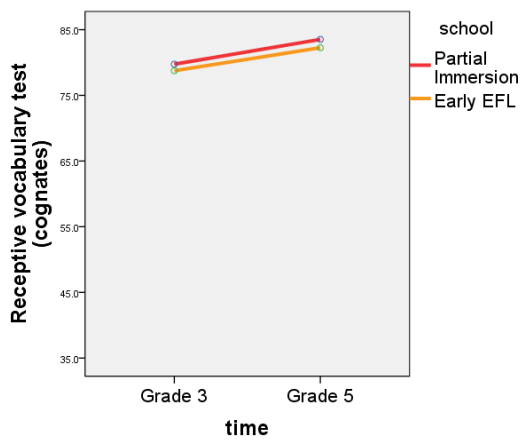


Figure 13: Growth of the receptive vocabulary knowledge on cognates for each type of school from grade 3 to grade 5.

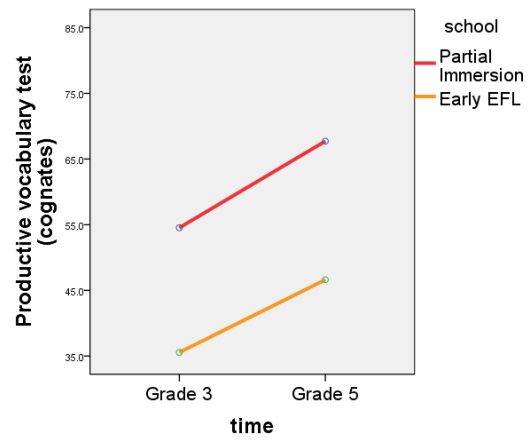


Figure 14: Growth of the productive vocabulary knowledge on cognates for each type of school from grade 3 to grade 5.

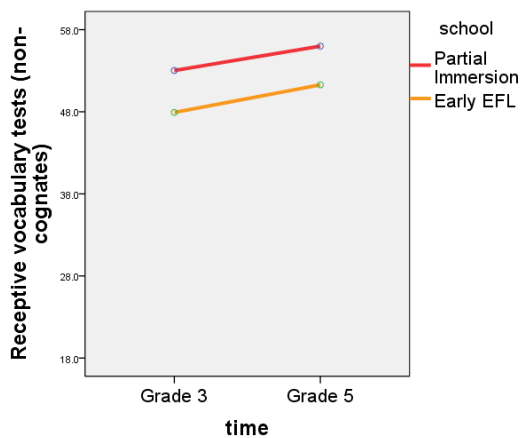


Figure 15: Growth of the receptive vocabulary knowledge on non-cognates for each type of school from grade 3 to grade 5.

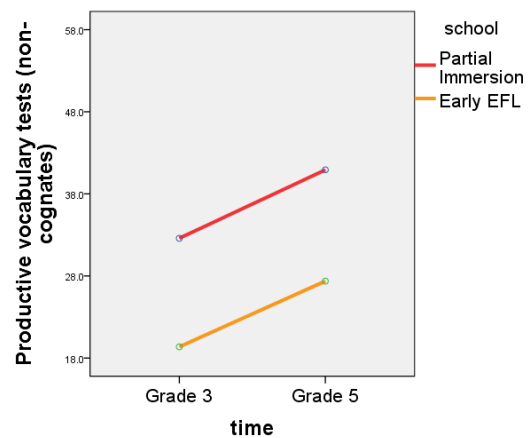


Figure 16: Growth of the productive vocabulary knowledge on non-cognates for each type of school from grade 3 to grade 5.

An examination of L2 children's mean percentage of correct responses on cognates and non-cognates would give significant information on the degree to which children rely on their L1 lexical knowledge. If more correct responses are observed on cognates it would be assumed that these words are acquired faster and easier than non-cognates and that L2 children rely on cross-linguistic similarities in order to comprehend and produce L2 words. Any differences between the two groups could be attributed to the different educational programs they follow. What the figures 9 through 12 show is that considerable differences were observed between the two groups on their performance on cognates at each vocabulary test. At grade 3, children from partial immersion schools had more accurate responses on cognates at the PPVT test ($M=79.75$, $SE=1.47$) than children from early EFL schools ($M=78.75$, $SE=1.47$). However, this difference is greater at the EVT test, with children from partial immersion schools performing better on cognates ($M=54.54$, $SE=3.8$) than children from early EFL schools ($M=35.55$, $SE=3.8$). Similarly, at grade 5, L2 children from partial immersion schools had more accurate responses on cognates at the PPVT test ($M=83.52$, $SE=2.19$) compared to L2 children from early EFL schools ($M=82.25$, $SE=2.19$). The difference between the two groups is greater at the EVT test, with the partial immersion group having significantly more correct responses on cognates ($M=67.72$, $SE=3.54$) compared to the early EFL group ($M=46.62$, $SE=3.13$).

An examination of the mean percentage of correct responses on non-cognates would give additional information on the degree to which L2 children relied on their L1 vocabulary knowledge when completing L2 lexical tasks. If L2 children were able to identify and produce L2 translation equivalents with little or no phonological similarity across Dutch and English, it could be argued that their performance was not affected by cross-linguistic similarities. In addition, any differences between the two groups can be attributed to the different educational programs they attend. In addition, similar differences were observed between the two groups on the percentage of correct responses on non-cognates. More specifically, at grade 3 the two groups had a slightly different performance at the PPVT test. L2 children from partial immersion schools had more accurate responses on non-cognates ($M=53.03$, $SE=1.5$) than L2 children from early EFL schools ($M=47.92$, $SE=1.27$). At the EVT test, a greater difference was observed, with L2 children from partial immersion schools having more accurate responses on non-cognates ($M=32.59$, $SE=2.69$) than L2 children from early EFL schools ($M=19.40$, $SE=3.62$). Furthermore, similar differences were observed between the two groups at grade 5. For the PPVT test, L2 children from partial immersion schools were more accurate on non-cognates ($M=56$, $SE=1.6$) compared to the early EFL group ($M=51.28$, $SE=2.19$). At the EVT test, the partial immersion group had again higher scores on non-cognates ($M=40.92$, $SE=3.48$) compared to the early EFL group ($M=27.36$, $SE=3.39$). It was observed that the difference between the two groups is greater at the EVT test.

Essentially, a significant main effect of the cognate status was observed, $F(1,48) = 800.75$, $p < .001$, $\eta^2 = .943$, indicating that children performed significantly different on translation equivalents with phonological similarity, with more accurate responses on cognates ($M = 66.087$, $SE = 1.23$) than non-cognates ($M = 41.059$, $SE = 1.37$). There was also a significant interaction between test and cognate status, $F(1,48) = 13.722$, $p = .001$, $\eta^2 = .222$, indicating that the magnitude of the cognate effect was greater at the PPVT than the EVT vocabulary test. More specifically, at the PPVT test there were more accurate responses on cognates ($M = 81.066$, $SE = .779$) than non-cognates ($M = 52.056$, $SE = .911$). At the EVT test there was a smaller difference between the mean percentage of accurate responses on cognates ($M = 51.107$, $SE = 2.25$) compared to non-cognates ($M = 30.063$, $SE = 2.042$).

In addition, there was a significant interaction among test, cognate status, and type of school, $F(1,48) = 5.880$, $p = .019$, $\eta^2 = .109$, suggesting that the two groups differed on their

performance on cognates for each type of test. More specifically, the difference between the two groups was greater at the productive (EVT) than the receptive vocabulary test (PPVT), with L2 children from partial immersion schools having more accurate responses on cognates ($M = 61.13$, $SE = 3.2$) than L2 children from early EFL schools ($M = 41.09$, $SE = 3.2$). At the receptive vocabulary test the difference between the two groups was significantly smaller, with L2 children from partial immersion schools being slightly more accurate on cognates ($M = 81.63$, $SE = 1.1$) than L2 children from early EFL schools ($M = 80.5$, $SE = 1.1$). When comparing the percentage of correct responses on non-cognates we observed essential differences between the two groups, primarily at the EVT test on which the partial immersion group was better able to identify non-cognates ($M = 36.76$, $SE = 2.9$) compared to the early EFL group ($M = 23.37$, $SE = 2.9$). On the PPVT test the partial immersion group had again higher scores on non-cognates ($M = 54.51$, $SE = 1.28$) than the early EFL group ($M = 49.6$, $SE = 1.29$), however the difference was non-significant.

There was no significant interaction between cognate status and type of school, $F(1,48) = .659$, $p = .421$, $\eta^2 = .014$, suggesting that L2 children from both types of school had in general a better performance on words with semantic and phonological overlap. There was also no significant interaction between time and cognate status, $F(1,48) = 2.002$, $p = .164$, $\eta^2 = .040$, showing that the cognate effect was not significantly different from grade 3 to grade 5. Furthermore, there was no significant interaction among time, cognate status, and type of school, $F(1,48) = .151$, $p = .699$, $\eta^2 = .003$. In addition, no significant interaction was observed among test, time, and cognate status, $F(1,48) = .789$, $p = .379$, $\eta^2 = .016$. Finally, no significant interaction was identified among type of test, time, cognate status, and school, $F(1,48) = .020$, $p = .889$, $\eta^2 = .000$.

In summary, a significant cognate effect was observed for both groups, with L2 children performing better on translation equivalents with phonological overlap. There was also a larger cognate effect on PPVT rather than the EVT vocabulary test, indicating that children were better able in correctly responding to cognates on the receptive rather than the productive vocabulary test. Significant differences were also observed between the two groups, with children from partial immersion schools being more accurate on both cognates and non-cognates. It was also observed that the difference between the two groups was greater for the productive rather than the receptive vocabulary test for both cognate and non-cognate words.

3.3 Summary

In conclusion, significant differences were observed between the two types of school on their receptive and productive vocabulary knowledge. In general, L2 children from partial immersion schools had a better performance on both the receptive and the productive vocabulary tests. The difference between the two schools, though, was greater for the productive rather than the receptive vocabulary test. More specifically, when children were examined on their overall performance, including cognates and non-cognates, the partial immersion group had significantly more correct responses on both types of tests (receptive and productive) at grade 3 and grade 5. When we included cognate status as a variable in the analysis, we observed that both groups were better able in identifying words with semantic and phonological overlap than words with no cross-linguistic similarities.

Cognates were, also, easier to identify at the receptive vocabulary test since there was a higher rate of correct responses on the PPVT test than the EVT test. This result indicates that lexical items with a high degree of phonological and semantic overlap between the two languages are easier to identify in the mental lexicon. The two groups differed on the magnitude

of the cognate effect according to the type of test examined. L2 children from partial immersion schools were more accurate on non-cognates at the EVT test compared to early EFL children, which means that they were able to correctly respond to items with little or no phonological similarity between Dutch and English. However, at the PPVT test no significant differences were observed on the cognate effect between the two groups.

Furthermore, the two groups showed a few similarities on the growth of their lexical knowledge from grade 3 to grade 5. L2 children from both types of school performed better at grade 5 at both the PPVT and EVT tests. It should also be noted that both groups scored higher at the receptive rather than the productive vocabulary test. These results were observed on their overall performance, but also on their performance on cognates and non-cognates.

Chapter 4: Discussion

The central focus of the current study was the examination of the receptive and productive vocabulary knowledge of native Dutch children learning English as a second language at partial immersion and early EFL schools. L2 children's vocabulary knowledge was examined over time, at grade 3 (aged 6-7) and grade 5 (aged 8-9). PPVT-4 test was used as a measure for the receptive vocabulary knowledge and EVT-2 for the productive vocabulary knowledge. We also examined the degree of reliance on L1 vocabulary knowledge with the cognate facilitation effect. Words with semantic and phonological overlap across Dutch and English were identified and the performance on cognates revealed significant information on the way L2 words were used. Any differences between the two groups could be attributed to the differences between the two types of school, with the primary difference being that of L2 exposure. L2 children from partial immersion schools were exposed to English for significantly more time compared to L2 children from early EFL schools.

The participants were selected carefully in order to control for two central criteria, age and socioeconomic status (SES). There were no significant differences between the two groups on their age and SES and the only factor that differentiates them is the type of education they follow (partial immersion and early EFL). In the subsequent sections we summarize the children's overall performance on the two vocabulary tests and the magnitude of the cognate facilitation effect for each vocabulary test and each type of school, in relation to our research questions. We give an explanation for the possible reasons each group had a different performance on cognates and non-cognate words. We then give a summary of the two types of school (partial immersion and early EFL) and possible explanations for the differences observed between the two. Finally, we present our assumptions on our results on the receptive and productive vocabulary tests using the different theoretical models of the bilingual mental lexicon presented in Chapter 1. We conclude by presenting the limitations of the current study and by suggesting further studies that can give additional information on our results.

4.1 Overall performance on receptive and productive vocabulary tests

Our first research question examined whether L2 children from partial immersion and early EFL schools would differ on their performance on receptive and productive vocabulary tests. In general, significant differences were observed between the two schools. According to our first hypothesis, we assumed that L2 children from partial immersion schools would have a better performance on both vocabulary tests. We also assumed that children from both groups would perform in a different way in each test, with more accurate responses on the PPVT test. The results confirmed these hypotheses. First, both groups performed significantly better on the receptive rather than the productive vocabulary test. This was also the case in Hemsley's et al (2012) study, where bilingual children performed significantly better on receptive vocabulary tasks. Furthermore, the significant interaction between type of school and type of test revealed that the partial immersion group outperformed the early EFL group at the productive vocabulary test (EVT). However, the two groups had a similar performance on the receptive vocabulary test (PPVT).

It was also assumed that both groups would have a better performance at the second time of testing, at grade 5. This hypothesis was also confirmed and L2 children's vocabulary

knowledge significantly improved over time. However, the rate of development was not the same between the two vocabulary tests since the difference from grade 3 to grade 5 was greater for the productive vocabulary test (EVT). This result shows that at the second moment of testing, L2 children had significantly improved their productive vocabulary knowledge.

Our results resemble those observed in Goriot's et al. (2018) study where children from early EFL and mainstream schools were examined on their receptive vocabulary knowledge. In mainstream schools English is introduced at the age of 10 onwards. The authors found that L2 children from early EFL schools were more accurate on the receptive vocabulary test (PPVT) than L2 children from mainstream schools. In the current study, with the type of education being the primary difference between the two groups, it was confirmed that a more intensive bilingual program, as the one in partial immersion schools, can significantly enhance the L2 lexical knowledge. It should be mentioned, though, that the two groups in our study had a considerably different performance in the productive rather than the receptive vocabulary test. In Goriot's et al. (2018) only the receptive vocabulary knowledge was examined and yielded significant differences. We assume that less significant differences between partial immersion and early EFL schools on their receptive vocabulary knowledge is a result of both group's intensive bilingual exposure. In other words, even the early EFL group, with significantly less L2 exposure than the partial immersion group, was able to rapidly enhance their receptive lexical skills. However, this was not the case for the productive vocabulary knowledge. Finally, it was also observed that the differences between the two groups remain steady over time.

4.2 The cognate facilitation effect

Our second research question asked whether the two groups made use of their L1 lexical knowledge when completing L2 lexical tasks. We predicted that both groups would show a significant cognate effect by producing more accurate responses on words with a high degree of semantic and phonological overlap between Dutch and English. The results observed here support our second hypothesis. L2 children, independent of the amount of exposure in English, performed significantly better on cognates than translation equivalents with little or no phonological similarity. This result resembles the findings of previous studies showing a significant cognate effect on young bilingual children (Brenders et al., 2011; Hemsley et al., 2013; Malabonga et al., 2008; Goriot et al., 2018). L2 children were able to make use of their L1 lexical knowledge when identifying or producing words in the L2 even from a very young age (6 years old). L2 children's significantly better performance on cognates suggests that cross-linguistic similarities enhance the word identification and retrieval process (Dijkstra, 2005; Poarch & Van Hell, 2012). As a result, it can be concluded that L2 children rely on the more dominant language, in this case their L1, when completing tasks in the L2.

The differences on children's performance on cognates compared to non-cognates was observed at both grades, suggesting that L2 learners were able to identify cognates even at the very first grades of school (grade 3). However, one of our hypotheses was that the magnitude of the cognate effect would be larger at grade 5 for both groups as a result of their enhanced L1 knowledge. This hypothesis was not born out, since no significant interaction between cognate effect and time was observed. Two possible reasons could explain this finding. First, the L2 children that participated in the current study were relatively young (aged 6-7 at grade 3 and 8-9 at grade 5) and their L2 proficiency was considerably low. Previous studies that have found an increase of the cognate effect over time have primarily examined simultaneous or

sequential bilingual children and not L2 learners (i.e Hemsley et al., 2012; Malabonga et al., 2008). It is hypothesized that the participants of the current study did not show a significant difference on the cognate effect from grade 3 to 5 due to their low L2 proficiency. It is our assumption that learners of a second language need more time in order to show a limited L1 reliance compared to simultaneous or early sequential bilinguals. Examination of older L2 learners from different educational programs is needed in order to make more elaborate claims on the magnitude of the cognate effect over time.

Another possible explanation could be the way cognates were identified. We operationalised cognates as a categorical instead of a continuous variable, identifying words as cognates or non-cognates. As a result, a lot of words that were partially similar across languages were identified as cognates. Previous studies that have found a significant change of the magnitude of the cognate effect over time have operationalized cognates as a continuous variable (Bosma et al., 2016). Bosma et al (2016) included partially similar cognates as a separate category. They observed a greater improvement on participant's performance on cognates with a high degree of cross-linguistic similarity rather than identical cognates. In the current study we were not able to examine whether there were differences between identical and partially similar cognates. The way L2 children process and retrieve cognates over time could differ regarding the degree of phonological similarity across languages. Further study on the rate of development of cognate words according to the degree of cross-linguistic similarity is needed in order to make generalisations on the cognate facilitation effect.

Significant differences were also observed on the cognate facilitation effect between the two groups that are worth mentioning. In general, L2 children from partial immersion schools were more accurate on cognates on both the receptive and productive vocabulary tasks. However, the difference between the two groups was significant only at the productive vocabulary test with L2 children from partial immersion schools being better able to identify cognate words at both grades. It is suggested that the nature of the two vocabulary tests plays a significant role on this finding.

A possible explanation for the larger difference on the productive vocabulary test is the different cognitive processes required for each type of test. The receptive lexical knowledge was examined through a word identification task. L2 children were presented with the linguistic properties of a word (more specifically the phonological properties of the target lexical item) and were required to identify the appropriate conceptual representation of the target word. In contrast, the productive vocabulary knowledge was examined through a word retrieval task during which L2 children were presented with the conceptual representation of the word and were required to orally produce the target lexical item. During word identification tasks, language-specific information was presented to the participants, since the exact phonological properties of the word were given. A high degree of cross-linguistic overlap could have led to accurate responses even if the word was not entirely known to the L2 learners. On the other hand, during a word retrieval task, the information given at the conceptual level did not reveal any significant information of the linguistic properties of a word. An accurate response during this task requires some previous knowledge of the linguistic properties of the lexical item once it has been selected. In other words, receptive lexical tasks require less effort for the participants to accurately respond on cognates while previous linguistic knowledge of the cognate word is required in the productive vocabulary tasks.

This explanation does not imply that there is no cognate effect in productive vocabulary tasks. It suggests that it is more difficult for L2 learners to accurately retrieve the target cognate in the productive vocabulary tests if it has not been represented before. This finding is supported by Dijkstra's et al (2010) study in which response time on cognate and non-cognate

words was examined. The authors found that in L2 lexical retrieval tasks children were slower in identifying cognates than non-cognates, a result that highlights the effort required by L2 children during the productive vocabulary tasks.

The difference between the two groups on the percentage of correct responses on cognates at the productive vocabulary tests is highly related to the type of education. If the argument outlined above is correct, it could be suggested that partial-immersion children had a prior knowledge of the cognate words that were identified and produced despite the language non-specific information provided. This suggests that the more intensive L2 educational program provided by partial immersion schools may have enhanced L2 children's productive vocabulary knowledge of cognates.

4.2.1 Accuracy on non-cognates

It has been mentioned in chapter 3 that L2 children's performance on non-cognates give central information on their receptive and productive lexical knowledge and the degree of L1 reliance. It was hypothesized that if children were able to perform better on non-cognates, then this would be evidence of advanced lexical proficiency since for these words cross-linguistic similarities are not available. We predicted that L2 children from partial immersion schools would be more accurate on words with no semantic and phonological overlap between Dutch and English. Our hypothesis was confirmed only for the productive vocabulary test. The partial immersion group was significantly more accurate on non-cognates when examined at the productive vocabulary test (EVT). At the receptive vocabulary test (PPVT) no significant differences were observed on non-cognates between the two groups. We attribute this difference to the different educational programs children were following and, more specifically, to the amount of L2 exposure to the target language. Previous studies (i.e Perez et al., 2010; Bosma et al., 2016) have examined the role of exposure on the magnitude of the cognate effect on lexical tasks. They found that considerable exposure to the target language enhances the acquisition of words with little or no phonological similarity. Similarly, in the current study the group with the higher exposure to English performed significantly better on non-cognates at the productive vocabulary test.

According to our results we assume that L2 children from partial immersion schools were better able to retrieve and produce the target lexical items in the L2 without making use of their L1 lexical knowledge. Previous literature suggests that the degree of L1 reliance is negatively correlated to language proficiency (Benders et al., 2011; Poarch & Van Hell, 2012). If we assume that high proficiency learners rely less on their L1 when using the L2 we could suggest that L2 children attending partial immersion schools reached higher levels of lexical proficiency compared to L2 children from early EFL schools when examined on their productive vocabulary knowledge.

4.2.2 Models of the bilingual lexicon

The way cognates are processed and acquired among bilinguals is a key element in second language acquisition in general. The results of the current study are similar with previous studies which found a faster and more accurate identification and production of cognate words (Lauro & Schwartz, 2016; Dijkstra et al., 2015; Starreveld et al., 2013). This

finding suggests that linguistic elements that are common between the first and the second language, such as the phonological elements of a word facilitate the L2 vocabulary learning. Cognates have been used as the experimental manipulation which shows that both languages are active during a communicative task independent of the language intended to be used. The faster and more accurate acquisition of cognate words is used as evidence of an integrated lexicon (Dijkstra, 2005). In chapter 1 we included two theoretical models of the bilingual mental lexicon, the Concept Mediation and Word Association model (Potter et al., 1984) and the Distributed Features Model (De Groot, 1992).

The models presented in chapter 1 assume a faster and more efficient acquisition of L2 words with cross-linguistic overlap. According to Word Association and Concept Mediation Model (Potter et al., 1984), at the early stages of L2 acquisition, learners rely more on their first language, assuming that the L1 is the more dominant one, in order to effectively acquire and process words in the second language. The results of the current study seem to be in line with the word association model (Potter et al., 1984) according to which the conceptual representation of a lexical item is not directly linked to the second language but is rather accessed through L1 mediation. As a consequence, words with cross-linguistic similarities are accessed faster and more efficiently. This is in line with previous studies that examined the cognate effect on both the L2 and L1 (Poarch & Van Hell, 2012; Brenders et al., 2011 among others). A significant cognate effect was only observed in the L2 and not the L1, indicating that less proficient learners access the conceptual representation of a lexical item in the L2 through the L1.

4.3 Receptive and productive vocabulary knowledge

Essential to the current study is L2 children's performance on each of the two vocabulary tests. Children were examined on their receptive and productive vocabulary knowledge through two standardised tests, the PPVT-4 and EVT-2 respectively. A common finding for both groups was their significantly better performance on the receptive vocabulary test. Receptive vocabulary knowledge represents learners' ability to relate a word with its corresponding meaning and is considered the first step in L2 vocabulary acquisition (Nation, 2001). Receptive vocabulary knowledge is highly related to the fast mapping of a word, a term that refers to the ability to relate a lexical item with its concept after mere exposure to it (Lüke & Ritterfeld, 2014). Productive vocabulary knowledge reflects the ability to recall and use the target word in a specific context and is related with an advanced stage of the lexical development. A corresponding term is the slow mapping which appears after extended exposure to the target item. The size of the receptive vocabulary is significantly bigger compared to the productive one, especially during the early stages of the language acquisition. According to our findings there are more words that learners understand and interpret but are unable to recall their linguistic form when required. When learning a second or foreign language, this phenomenon is even more prevalent, since learners have already mapped a specific concept with its linguistic interpretation in the L1. It is easier to identify the meaning of a word rather than to recall its linguistic form.

Another significant finding related to the two vocabulary tests is the rate of vocabulary growth over time. Both groups showed a significant improvement in their vocabulary knowledge from grade 3 to grade 5. However, the significant interaction between type of test and time showed that the growth of the lexical knowledge was greater at the productive rather

than the receptive vocabulary test. This result shows that after two years of exposure to the second language, L2 children's productive vocabulary knowledge significantly improved.

Our findings on the receptive and productive vocabulary tests are in line with previous studies that have examined L2 lexical acquisition (Lüke & Ritterfeld, 2014; Hemsley et al., 2012). The authors found that L2 learners perform significantly better at receptive vocabulary tasks, arguing that the first stage in lexical consolidation is perception rather than production. However, after extensive exposure to the second language, semantic, phonological, orthographic and grammatical elements of the target items become intake, leading to the enhancement of L2 lexical acquisition.

In general, the results of the current study show that L2 exposure in the educational environment plays a significant role in L2 lexical acquisition. Although both groups showed a significant growth of their vocabulary knowledge over time, the more intensive L2 group had a better performance on the two vocabulary tests, which was greater in the productive vocabulary tasks. Considering the productive vocabulary knowledge as the advanced stage in lexical acquisition, increased exposure to a second or foreign language can have a positive impact on the complete acquisition of the L2 word.

4.4 Type of education and L2 lexical development

The two types of school that have been examined in the current study are partial immersion and early EFL schools. In chapter 1 we presented the differences between the two bilingual programs that primarily lie in the exposure to the second language (English). We suggested that the differences between the two groups on their performance on the two vocabulary tests are closely related to the differences in L2 exposure. L2 children from partial immersion schools are exposed to English for significantly more time (approximately 472.2 minutes per week) compared to early EFL group (approximately 109.3 minutes per week).

We found that L2 exposure at school had a significant impact on L2 lexical development. L2 children attending a more intensive bilingual program (partial immersion) were better able to identify and produce a word in the second language compared to L2 children from a less intensive program (early EFL). Previous studies that have examined the L2 lexical acquisition and the factors that affect the rate of vocabulary growth in the second language have concluded that frequency of exposure is a significant predictor of vocabulary learning and, more specifically, of word recognition (Godfroid, Ahn, Choi, Ballard, Cui, Johnston, Lee, Sarkar, & Yoon, 2017). According to the Noticing Hypothesis (Schmidt, 1990, 2010) for a new word to be fully acquired, repeated exposure is a significant but not the only factor. Noticing and intentional learning are significant factors as well. Learners need to notice the different linguistic parts of a word for input to become intake. Although we did not focus here on the pedagogical methodologies applied and the way the L2 vocabulary was presented and examined in the L2 classroom, we conclude that intensive L2 exposure in relation to a content-based learning did enhance the intake of the L2 vocabulary. As a result, the significantly better performance of the partial immersion group, primarily at the productive vocabulary test, highlights the effectiveness of a more intensive bilingual program.

Apart from the amount of L2 exposure, the methodological approaches followed in the classroom are of equal importance. Both types of school follow a content-based approach of learning and the lessons are conducted in a communicative way. The extra hours of L2 exposure in partial immersion schools did not entail the presentation of English as a separate course.

English is used as the medium of instruction for core subjects as well. Learners in partial immersion schools are not instructed to explicitly learn and memorize the new vocabulary but are rather exposed to new L2 words through communicative activities. Additionally, the transition from one language to the other is set on specific conditions and tasks for most of the partial immersion schools, making it easier for children to follow the lesson in each of the two languages. It is concluded that L2 exposure at school in relation to the pedagogical methodologies followed have a positive impact on the perceptive and productive vocabulary acquisition in the second language.

4.5 Limitations

The current study has given significant information on the relation between the type of bilingual education and the L2 lexical development. However, before making several generalizations on L2 lexical acquisition, there are a few limitations to the current study that need to be mentioned.

To begin with, we were not able to control for L2 exposure outside school. Although the parental questionnaire provided some important information on the amount of exposure on each language at home, it was difficult for us to include in the current analysis the amount of L2 exposure outside school. The rate of response to the parental questionnaire was not the same for all participants, making it more difficult to include out-of-school exposure as a covariate in our analysis. It is generally claimed that children from partial immersion schools are exposed to more out-of-school English activities. As a result, the amount of out-of-school L2 exposure was confounded with type of education. Further research is needed in order to examine the impact of out-of-school exposure on L2 lexical acquisition on L2 learners.

Another important aspect that should be mentioned is the way cognates were operationalized. We operationalized cognates as a categorical rather than a continuous variable. That is words were identified as cognates or non-cognates. Many studies have examined cognates as a continuous factor (e.g., Dijkstra et al., 2010; Bosma et al., 2016) focusing on the gradual effect of cross-linguistic similarities on L2 children's language development. Such a distinction provides additional information on the degree to which L2 children rely on the L1 lexical knowledge in order to effectively acquire the new vocabulary to the second language and the degree to which such a reliance changes over time (Bosma et al., 2016). The magnitude of the cognate effect is related to the degree of phonological similarity. Bosma et al. (2016) found that the ability to identify cognates with a low degree of cross-linguistic similarity increases over time. It should be mentioned though that in the current study only the phonological and semantic similarities were examined and not the orthographic overlap across languages since both the PPVT and EVT vocabulary tests are presented orally. As has been explained in chapter 2 (section 2.4) we assume that partially similar cognates, with regards to phonology, are easier to be identified due to phoneme variations across languages.

Another point that might be a potential limitation of our study is the limited examination of L2 children's literacy skills. As has been already mentioned, both vocabulary tests did not examine the orthographic interpretation of the L2 words. However, some of the L2 children would have been able to read or write in the second language in grade 5. Knowledge of the spelling of the L2 words could have enhanced the identification and production of cognates at the second moment of testing. However, the non-significant interaction between time and

cognate status suggests that the development of literacy skills from grade 3 to 5 did not affect the magnitude of the cognate effect.

Finally, it should be mentioned that the number of participants was relatively small ($n=50$ in total). This was a randomly selected sample, however we controlled for children's L1, age, and SES. Further research, including a wider number of participants, would be needed in order to make further generalisations.

4.6 Future research

The current study examined the L2 receptive and productive lexical development of children from partial immersion and early EFL schools in the Netherlands. Significant results were identified on L2 children's vocabulary knowledge and the differences between the two types of school. It should be mentioned, though, that L2 vocabulary does not develop in a linear way and it is more accurate to characterise it as a "multifaceted process" (Pignot-Shavov, 2012). Vocabulary development does not only involve the mapping between the conceptual and orthographic or phonological interpretation of a word. There are other aspects that need to be examined as well. In order to get a clearer picture of L2 children's lexical development according to the two different types of school included here, we need to examine other aspects of the vocabulary knowledge. For instance, the productive use of L2 lexical items in a freer activity, such as in a writing task, could give us an insight into the way L2 children from different types of school select and use the L2 words in a specific context. In that way a comparison could be made in the use of L2 lexical items between controlled and freer activities.

Of great significance would also be the examination of the quality of the lesson between the two types of school. The current study included the general differences between partial immersion and early EFL schools with primary being that of exposure. It is also true though, that children from both types of school are exposed to both native and non-native language input. Further study is needed in order to examine the effect of non-native input on children's linguistic development in the second language. Sebastian-Galles (2010) has highlighted the importance of investigating the differences between native and non-native language input in bilinguals' language development, a field that has not been fully investigated yet. L2 exposure at school and its impact is a less examined domain and could give significant results on the effect of input outside children's home.

4.7 Implications

The current study has important implications for the field of second language acquisition and more specifically for the lexical development of L2 children. Central here was the finding that partial immersion education led to higher vocabulary scores compared to early EFL education, especially for the productive vocabulary. This finding adds to the ongoing pilot study of partial immersion schools in the Netherlands (FoTo project). The FoTo project has examined the receptive vocabulary knowledge of children from partial immersion and early EFL schools from grade 1 (aged 4-5). The results from grade 1 are similar with our results from grades 3 and 5, with partial immersion group scoring higher. The difference between the two types of school remains constant over time, showing a steady increase of the receptive vocabulary. Additionally, the inclusion of the productive vocabulary test gave a clearer picture

of the L2 lexical development since it revealed greater differences between the two groups. Since partial immersion schools have been implemented the past few years, the findings of the present study add to the general examination of these schools on their overall impact.

The present study also adds to previous literature examining the cognate facilitation effect. We found that, in addition to age and language proficiency, exposure to the target language in the educational environment is also a significant factor on the way cognates are identified and used. The differences on L2 children's performance on cognate and non-cognate words showed that schools providing more hours of English instruction establish a faster acquisition of words with cross-linguistic similarities. As a result, education seems to play a vital role on second language acquisition and the current results can lead to future studies that would further investigate the role of different educational programs on L2 children's linguistic development.

In relation to what has been mentioned previously, our findings are of great pedagogical value. A communicative approach in second language teaching and a content-based learning are educational methodologies that have been used in both types of school and led to a steady development of L2 vocabulary knowledge over time. In addition, distributing the amount of exposure between two languages within a school day can significantly enhance the development of L2 vocabulary knowledge without affecting the development of the L1.

Chapter 5: Conclusion

The current study examined the L2 lexical development of native Dutch children learning English as a second language at partial immersion and early EFL schools using a receptive (PPVT) and a productive (EVT) vocabulary test. L2 children's performance was examined at two points in time, at grade 3 (ages 6-7) and at grade 5 (aged 8-9). In particular, the present study investigated whether L2 children made use of their native language when identifying or producing words in the L2. L1 reliance was measured through the cognate facilitation effect. More specifically, we identified the cognates from the two vocabulary tests, that is words with a high degree of cross-linguistic similarities between Dutch and English. We examined whether any differences would be observed between the two groups on their performance on the two vocabulary tests as an attempt to investigate the impact of partial immersion education on L2 lexical development.

Significant differences were observed between the two groups on their overall performance, when cognate and non-cognate words were included in the analysis. We found that L2 children from partial immersion schools had a better performance than L2 children from early EFL schools, especially at the productive vocabulary test. We considered productive vocabulary knowledge as the outcome of an extensive exposure to the L2 vocabulary and explained this result in relation to the intensive education program provided by partial immersion schools. This explanation was also supported by the rapid growth of the productive vocabulary knowledge from grade 3 to grade 5. It was suggested that both groups, after two years of exposure to the L2 at school, showed an advanced ability to produce lexical items in the second language. Our results are in line with the Noticing Hypothesis (Schmidt, 1990, 2010), according to which repeated exposure to the second language enhances its acquisition.

The way L2 children used cognates on the receptive and productive vocabulary tests revealed significant information on the way they relied on the L1 lexical knowledge. We found that cognates were easier to be identified and produced compared to words that did not share any phonological similarities across languages. The magnitude of the cognate effect was larger for the receptive vocabulary tests, a fact that can be explained by the different cognitive processes required for each type of test. We suggested that the language-specific information provided during the receptive vocabulary test helped L2 children identify words with cross-linguistic similarities.

Examining the percentage of correct responses on words with little or no phonological similarity gave additional information on the degree to which L2 children rely on their L1 vocabulary. We observed that the partial immersion group achieved higher scores on non-cognates, especially at the productive vocabulary test. As was the case with cognates, we attributed this result to the difficulty of the productive vocabulary test. We concluded that L2 children from partial immersion schools showed a better ability in using L2 words with limited reliance on their L1. Subsequently, partial immersion education provides adequate L2 exposure for the development of the L2 lexicon.

In sum, the different educational programs examined here were used as an explanation for the different results observed between the two groups. We assume that extensive exposure to the target language can significantly enhance the development of an L2 vocabulary. Partial immersion education has significant implications on second language acquisition and their implementation can benefit L2 learners on their lexical development. Further research is required that would examine the implication of partial immersion education on the L2

development. Keeping track of children's performance on L2 lexical tasks over the years would have essential implications on the way the L2 vocabulary develops over time.

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Appendix

Table 5: Items included in the PPVT and EVT vocabulary tests along with their Dutch translation equivalents and their phonological similarity scores.

PPVT vocabulary test			
Item	English word	Dutch translation	Phonological similarity
1	Ball	Bal	0.50
2	Dog	Hond	0.00
3	Spoon	Lepel	0.00
4	Foot	Voet	0.33
5	Duck	Eend	0.00
6	Banana	Banaan	0.43
7	Shoe	Schoen	0.25
8	Cup	Kopje	0.40
9	Eat	Eet	0.33
10	Bus	Bus	0.67
11	Flower	Bloem	0.20
12	Mouth	Mond	0.25
13	Pencil	Potlood	0.17
14	Cookie	Koekje	0.40
15	Drum	Trommel	0.33
16	Turtle	Schildpad	0.12
17	Red	Rood	0.33
18	Jump	Spring	0.00
19	Carrot	Wortel	0.33
20	Read	Lees	0.00
21	Toe	Teen	0.33
22	Belt	Riem	0.00
23	Fly	Vlieg	0.25
24	Paint	Schilder	0.14
25	Dance	Dans	0.80
26	Whistle	Fluitje	0.00
27	Kick	Schop	0.00
28	Lamp	Lamp	0.75
29	Square	Vierkant	0.14
30	Fence	Hek	0.00
31	Empty	Leeg	0.00
32	Happy	Blij	0.25
33	Fire	Vuur	0.00
34	Castle	Kasteel	0.50
35	Squirrel	Eekhoorn	0.29

36	Throw	Gooi	0.00
37	Farm	Boerderij	0.00
38	Penguin	Pinguin	0.71
39	Gift	Cadeau	0.00
40	Feather	Veer	0.25
41	Cobweb	Spinnenweb	0.12
42	Elbow	Elleboog	0.20
43	Juggle	Jongleer	0.00
44	Fountain	Fontein	0.43
45	Net	Net	0.67
46	Shoulder	Schouder	0.29
47	Dress	Aankleed	0.17
48	Roof	Dak	0.00
49	Peek	Gluur	0.00
50	Ruler	Liniaal	0.00
51	Tunnel	Tunnel	0.60
52	Branch	Tak	0.14
53	Envelope	Envelop	0.50
54	Diamond	Diamant	0.37
55	Calendar	Kalender	0.62
56	Buckle	Gesp	0.00
57	Saw	Zaag	0.00
58	Panda	Panda	0.60
59	Vest	Gilet	0.20
60	Arrow	Pijl	0.00
61	Pick	Pluk	0.50
62	Target	Doelwit	0.33
63	Drip	Druppel	0.50
64	Knight	Ridder	0.00
65	Deliver	Bezorg	0.00
66	Cactus	Cactus	0.67
67	Dentist	Tandarts	0.25
68	Float	Drijf	0.00
69	Claw	Klauw	0.50
70	Uniform	Uniform	0.44
71	Gigantic	Gigantisch	0.20
72	Furry	Harig	0.00
73	Violin	Viool	0.25
74	Group	Groep	0.60
75	Globe	Aardbol	0.00
76	Vehicle	Voertuig	0.14
77	Chef	Kok	0.00
78	Squash	Pompoen	0.00

79	Ax	Bijl	0.00
80	Flamingo	Flamingo	0.67
81	Chimney	Schoorsteen	0.00
82	Sort	Sorteer	0.50
83	Waist	Taille	0.00
84	Vegetable	Groente	0.25
85	Hyena	Hyena	0.29
86	Plumber	Loodgieter	0.12
87	River	Rivier	0.40
88	Timer	Timer	0.50
89	Catch	Vang	0.00
90	Trunk	Stam	0.00
91	Vase	Vaas	0.25
92	Harp	Harp	0.75
93	Bloom	Bloei	0.60
94	Horrified	Geschokt	0.00
95	Swamp	Moeras	0.00
96	Heart	Hart	0.75
97	Pigeon	Duif	0.17
98	Ankle	Enkel	0.60
99	Flame	Vlam	0.40
100	Wrench	Moersleutel	0.22
101	Aquarium	Aquarium	0.44
102	Refuel	Bijtank	0.00
103	Safe	Kluis	0.00
104	Boulder	Rotsblok	0.12
105	Reptile	Reptiel	0.57
106	Canoe	Kano	0.40
107	Athlete	Atleet	0.33
108	Tow	Wegsleep	0.00
109	Luggage	Bagage	0.00
110	Direct	Leid	0.00
111	Vine	Wijnstok	0.12
112	Digital	Digitaal	0.29
113	Dissect	Ontleed	0.14
114	Predatory	Roofzuchtig	0.11
115	Hydrant	Brandkraan	0.11
116	Surprised	Verrast	0.25
117	Palm	Palm	0.75
118	Clarinet	Klarinet	0.62
119	Valley	Vallei	0.60
120	Kiwi	Kiwi	0.67
121	Interview	Interview	0.75

122	Pastry	Gebak	0.00
123	Assist	Help	0.00
124	Fragile	Fragiel	0.37
125	Solo	Solo	0.33
126	Snarl	Grom	0.00
127	Puzzled	Verbaasd	0.00
128	Beverage	Dranken	0.00
129	Inflated	Opgepompt	0.00
130	Tusk	Slagtand	0.12
131	Trumpet	Trompet	0.71
132	Rodent	Knaagdier	0.00
133	Inhale	Inhaleren	0.43
134	Links	Schakels	0.17
135	Pollute	Vervuil	0.14
136	Archeologist	Archeoloog	0.08
137	Coast	Kust	0.60
138	Inject	Injecteer	0.14
139	Fern	Varen	0.20
140	Mammal	Zoogdier	0.00
141	Demolish	Sloop	0.14
142	Isolation	Afzondering	0.00
143	Clamp	Klem	0.60
144	Dilapidated	Bouwvallig	0.00
145	Pedestrian	Voetganger	0.10
146	Interior	Interieur	0.44
147	Garment	Kledingstuk	0.10
148	Depart	Vertrek	0.00
149	Feline	Katachtig	0.00
150	Hedge	Heg	0.25
151	Citrus	Citrusvrucht	0.36
152	Florist	Bloemist	0.57
153	Hover	Zweef	0.00
154	Aquatic	Aquatish	0.43
155	Reprimand	Berisp	0.10
156	Carpenter	Timmerman	0.00
157	Primate	Primaat	0.50
158	Glider	Zweefvliegtuig	0.00
159	Weary	Vermoeid	0.14
160	Hatchet	Handbijl	0.12
161	Transparent	Doorzichtig	0.09
162	Sedan	Sedan	0.60
163	Constrained	Belemmerd	0.10
164	Valve	Afsluiter	0.11

165	Parallelogram	Parallelogram	0.50
166	Pillar	Pilaar	0.40
167	Consume	Consumeer	0.25
168	Currency	Valuta	0.00
169	Hazardous	Riskant	0.00
170	Pentagon	Vijfhoek	0.00
171	Appliance	Apparaat	0.25
172	Poultry	Gevogelte	0.00
173	Cornea	Hoornvlies	0.12
174	Peninsula	Schiereiland	0.00
175	Porcelain	Porselein	0.56
176	Detonation	Ontploffing	0.11
177	Cerebral	Cerebraal	0.75
178	Perpendicular	Loodrecht	0.00
179	Submerge	Onderdompel	0.09
180	Syringe	Spuitje	0.14
181	Lever	Hefboom	0.00
182	Apparel	Kledingstuk	0.00
183	Talon	Klauw	0.20
184	Cultivate	Verbouw	0.00
185	Wedge	Wig	0.25
186	Ascend	Oploop	0.00
187	Depleted	Leeggehaald	0.00
188	Sternum	Borstbeen	0.12
189	Maritime	Maritiem	0.50

EVT vocabulary test

Item	English word	Dutch translation	Phonological similarity
31	lorry	vrachtwagen	0.1
32	ring	ring	1
33	three	drie	0.5
34	bread	brood	0.5
35	couch	bank	0.2
36	neck	nek	0.67
37	four	vier	0
38	brush	borstel	0.43
39	bag	zak	0
40	triangle	triangel	0.45
41	chin	kin	0.5
42	candle	kaars	0.2

43	circle	cirkel	0.67
44	bridge	brug	0.4
45	kangaroo	kangoeroe	0.62
46	five	vijf	0.5
47	nest	nest	0.75
48	ladder	ladder	0.75
49	climbing	klimmen	0.57
50	helmet	helm	0.5
51	firefighter	brandweerman	0
52	gray	grijs	0.2
53	thumb	duim	0.25
54	dad	pa	0
55	octopus	octopus	0.57
56	guitar	gitaar	0.4
57	writing	schrijven	0.12
58	sad	verdrietig	0.12
59	chain	ketting	0.2
60	rose	roos	0.25
61	lock	slot	0.25
62	taxi	taxi	0.8
63	fishhook	vishaak	0.5
64	rake	hark	0.2
65	stairs	trap	0
66	branch	tak	0.14
67	kitten	katje	0.25
68	done	gedaan	0.4
69	coat	jas	0
70	map	kaart	0
71	bench	bank	0.2
72	close	sluiten	0.14
73	tomato	tomaat	0.37
74	camel	kameel	0.6
75	start	starten	0.43
76	donkey	ezel	0
77	pear	peer	0.67
78	barn	stal	0.25
79	large	groot	0
80	judge	rechter	0
