The effects of early-English education on phonological awareness skills in relation to vocabulary development

Master's thesis

Student: Maaike ten Buuren

Student ID: s4352718

Course of study: MA General Linguistics,

Radboud University Nijmegen

Contact: Maaike.buuren@student.ru.nl

Supervisor: Claire Goriot MSc

Second grader: dr. Sharon Unsworth

Date: 18-7-2017

Word count: 24.356

Acknowledgements

From the first time I heard about early-English education, I have always been very much intrigued by this type of education. In November, I made the decision to write my thesis on this topic. This turned out to be a good choice. It allowed me to zoom in on the topic and I learned a lot from it, not only in terms of theoretical knowledge but also in practical skills, by visiting the schools for testing participants. Visiting the schools, and thereby seeing the diversities in performance between different children, also contributed to the decision that I made when I was halfway through this project to do a second master's specialisation in Special Educational Needs. I am very grateful that this project made me realise the path that I want to follow.

I would like to greatly thank Claire Goriot, my first thesis supervisor, for her pleasant cooperation, good ideas and enthusiasm in this project. When I had questions, she was always very helpful. I am very grateful that I could conduct my project within such a big project.

I also would like to thank Sharon Unsworth, the second grader of this thesis, for being willing to read and grade this thesis. Thirdly, I would like to express my gratitude to Roeland van Hout for his time to talk about ideas and solutions regarding the statistics. Finally, I am very thankful for the schools and children who participated in this study for their willingness to participate and their effort and enthusiasm in doing so.

Maaike ten Buuren,

Nijmegen, July 2nd 2017

Table of contents

Abstract

Prior studies on the effect of bilingualism and immersion education on phonological awareness skills have found three intriguing effects when it comes to phonological awareness development. Firstly, bilingual children have been found to have a smaller vocabulary size than monolingual children. Secondly, a smaller vocabulary size has been found to lead to worse phonological awareness skills. Thirdly, bilingual children outperformed their monolingual peers on their phonological awareness skills. In accordance with the first two effects, bilingual children would, however, be expected to be worse at phonological awareness. This evokes an intriguing contradiction. The aim of the present study was to investigate this contradictory pattern in children in early-English education instead of bilingual children and to investigate whether this contradiction could be related to combined vocabulary size instead of the separate vocabulary sizes, as previous studies only concerned separate vocabulary sizes. To reach both aims, the question that was addressed in the present study was to what extent vocabulary development related to phonological awareness development in children in early-English education compared to children in regular education. A total of 151 Dutch-speaking children in grade 1 and 2 were asked to perform two phonological awareness tasks in Dutch, i.e., synthesis and rhyming, as well as a receptive Peabody Picture Vocabulary Test. From the current study, the contradiction that became clear from the literature did not appear. It was found that children in early-English education did not differ significantly from children in regular education with respect to their rhyming and synthesis skills. Furthermore, combined Dutch and English vocabulary size explained phonological awareness scores better than separate Dutch or English vocabulary size. This provides evidence that it is indeed important to consider combined vocabulary size instead of separate vocabulary size.

1. Introduction

General introduction

In the Netherlands, the number of schools offering early-English education is increasing. In 2015, the estimated number of primary schools offering early foreign language education was 850, which is about 12 percent of all primary schools in the Netherlands (Unsworth et al., 2015). In 2016, this amount had already increased to around 1.150 primary schools (EP-Nuffic, 2016). Nearly 90 percent of these schools provide English as a foreign language to pupils from the age of 4 onwards. The remaining 10 percent provide Spanish, French or German as a foreign language (EP-Nuffic, 2016). Because this type of education is still developing, the amount of research on this specific type of education is rather limited. Research on the effects of early foreign language education or *immersion education* on children's proficiency level, on the other hand, is quite numerous outside of the Netherlands. However, these studies did not always yield clear results. As for the studies concerning immersion education, the main difference between immersion education and early-English education is that in immersion education the foreign language is the medium of instruction and interaction, i.e. children are "immersed" in a foreign language, whereas children in early-English education attend only between 15 and 220 minutes of English education a week (Persson, 2012). Because of this difference, previous research on immersion education cannot be generalised to early-English education in the Netherlands. As for early foreign language studies on phonological awareness that considered children in early foreign language programmes outside of the Netherlands, a lot of studies were not generalisable to the Dutch early-English situation either. For instance, a study by Chien, Kao & Wei (2008) did look at early foreign language children in the same domain as the present study, but focused on 10 to 11 year olds. It is, however, very important to gain more knowledge on the impact of early-English education, as it does concern a large group of children attending these schools. In addition, if research on early-English education yields positive or negative effects, this could be reason to adapt, for example, the existing early-English lessons schools provide, to improve

this form of education, or to perhaps consider whether or not to expand this form of education to all schools, in the future.

An aspect about which consensus in previous studies on immersion education and early-English education has not been reached yet is phonological awareness. Phonological awareness can be defined as the ability to "consciously reflect upon phonological segments of spoken words and manipulate these segments in a systematic manner" (Verhoeven, 2007, p. 427). Phonological awareness is, for instance, involved in "the division of words into phonemes and syllables, the recognition of rhymes, and alliteration, the use of phonemes and syllables from words, and the omission, addition, or replacement of phonemes within words" (Verhoeven, 2007, p. 427). Despite previous studies finding a positive effect of bilingualism on phonological awareness (Campbell & Sais, 1995; Chen et al., 2004), the effects of immersion education and early-English education on this matter remain relatively unclear.

Other studies assessed the effects of vocabulary size on phonological awareness and found that a bigger vocabulary size leads to better phonological awareness skills (Chiang & Rvachew, 2007; Metsala, 1999; Rolla et al., 2006). Furthermore, prior studies on the effects of bilingualism found a negative relationship between bilingualism and vocabulary size (e.g. Bialystok et al., 2010; Doyle et al., 1997; De Houwer, Bornstein & Putnick, 2013). Bilinguals were found to have a smaller vocabulary size than monolinguals when assessed in the language that they have in common. Based on those results, one would expect that bilingual speakers would have lower phonological awareness scores than monolingual speakers because they tend to have a smaller vocabulary size and a smaller vocabulary size was found to lead to worse phonological awareness scores. Remarkably, however, it was found that bilinguals speakers had a better instead of a worse phonological awareness command than monolingual speakers (Campbell & Sais, 1995; Chen et al., 2004). This seems to evoke an intriguing contradiction.

In the current study, focusing on grade 1 and 2 primary school pupils, I will investigate the impact that early-English education has on children's phonological awareness development in Dutch. The reason for this is that previous studies showed a clear positive effect of bilingualism on phonological awareness skills (Campbell & Sais, 1995; Chen et al., 2004), but the findings from studies on immersion education showed more variation (Bruck & Genesee, 1995; Chiappe, Glaeser & Ferko, 2007; Tingley et al., 2004; Yelland, Pollard and Mercuri, 1993). Studies on the effects of early-English education in the Netherlands on phonological awareness development are non-existent. A study on the effects of early foreign language education in China on phonological awareness (Chien et al., 2008) did find positive effects of the language exposure on phonological awareness skills, but this study only concerned older children, as they were 10 to 11 years old. This is the reason why the present study will focuse more on the comparison to immersion education studies in the following sections; they consider the same age, i.e., first or second grade. It is interesting to investigate what the effect of early-English education in the Netherlands is on phonological awareness, because the amount of English language exposure in early-English education is less than in immersion education which leads to the question whether the same enhanced effect on phonological awareness also holds with less exposure. Furthermore, as described in the previous paragraph, in previous studies a greater vocabulary size was found to predict higher scores in phonological awareness (e.g. Chiang & Rvachew, 2007; Metsala, 1999; Rolla et al., 2006) although bilinguals possess a smaller vocabulary size (e.g. Bialystok et al., 2010; Doyle et al., 1997; De Houwer, Bornstein & Putnick, 2013) but still outperform monolinguals in phonological awareness tasks (Campbell & Sais, 1995; Chen et al., 2004). However, studies on bilingual children considered only one language's vocabulary size. When both languages would be taken together this would provide a clearer view of the children's vocabulary size. Therefore, combined vocabulary size is an intriguing factor to include in the study. Perhaps previous studies were wrong in taking only

one vocabulary size into account and perhaps the outcomes will be different or more reliable when combining the two vocabulary sizes to become an overall vocabulary size. Children could, namely, have lower vocabulary sizes than monolingual children in both languages because of environmental factors but their combined vocabulary size could be comparable to monolinguals.

First, I will provide an introduction which discusses previous literature on the role of immersion education, bilingualism and vocabulary size on phonological awareness and the role of bilingualism on vocabulary size. This introduction will be outlined as follows. I will start with describing the situation in the Netherlands by explaining what early-English education in the Netherlands looks like. Secondly, I will provide a general introduction to phonological awareness development. This will be followed by sections on the role of bilingualism and immersion education on phonological awareness and the role of vocabulary size on phonological awareness, ended by the role of bilingualism on vocabulary size. After that, I will highlight the problem or contradiction that follows from these sections that I will address in the current study. Finally, I will explain my research questions and the hypotheses that belong to them.

1.1 Early-English education in the Netherlands

To create a more solid context to place the present study in, I will first define what early-English education in the Netherlands looks like. In the Dutch educational system, regular schools typically offer English language education starting from grade 7, when pupils are 10-11 years old. The most commonly established age to start foreign language learning in other countries in Europe is comparable, with an average of 8-11 years old, with exceptions like Norway, Luxembourg and Austria (age 6) and Belgium (age 12) (Herder & De Bot, 2005). Early-English education distinguishes itself from these regular educational systems in the sense that early-English schools start providing English lessons from the first grade on already, starting at the age of 4. Not only in the Netherlands, but also in other countries early foreign language learning becomes increasingly popular, especially regarding English as a foreign language (Herder & De Bot, 2005). In this international context, there has been some debating on what the best starting age for early foreign language learning is (Muñoz, 2006). Like in the Netherlands, in Europe the most common age to start *early* foreign language learning is at the start of primary school, which is around 4 to 5 years old. Some countries start a bit later, for example Spain, with a starting age of 8 years old (De Bot, 2014). According to Goorhuis-Brouwer and Schaerlaekens (2000), first and second grade in primary school are the most optimal ages to start early-English education. Firstly, they state this is because of the plasticity of the child's brain, which means that the connections between neurons in the human brain (the synaptic network) are constantly adapting as a result of experience, thus by what we learn. Whenever we learn something new, a connection between neurons is made and neurons fire to each other. The connections between the neurons get stronger by exposure. Every time we encounter this same learning situation, the connections between the neurons that are involved get stronger, and thereby the synaptic network, which consists of the synaptic connections between the neurons, adapts. Secondly, children need their time in third and fourth grade to learn mathematics, and writing and reading in the first language. They argue that the latter reason makes that third and fourth grade are less appropriate as a starting age, because much time is required for writing, reading and mathematics and, when starting early-English education in the same grade, this could be too many new subjects at the same time for the pupils.

Typically, children attending early-English education schools in the Netherlands receive, on average, between 15 and 220 minutes of English language exposure per week from grade 1 onwards, whereas children in regular education typically receive about 45 minutes of English language exposure a week from the penultimate grade onwards (Persson, 2012; Thijs, Tuin & Trimbos, 2011). This is an important difference when comparing early-English education in the Netherlands to for instance early foreign language instruction in other countries or immersion education in other countries. In immersion education, the second language (L2) is the medium of instruction and the time spent on the L2 is substantially more than in early-English education, namely 50-100% of the time (Gilzow & Rodes, 2000; Lo & Murphy, 2010; Swain & Johnson, 1997).

Although the educational programmes of immersion education and early-English education differ a lot, the reason that schools have for offering a foreign language at an early age is quite similar in both types of education (Aarts & Ronde, 2006). Immersion education programmes aim to "enrich" the children's native language by learning an additional second language, typically a language of status (Westhoff, 1994). By enriching, Westhoff (1994) means that children can improve general skills from which they can benefit in life, e.g. increased communicative abilities and creativity. For early-English education, the goal is quite similar. Persson (2012) conducted a questionnaire among 66 schools offering early-English education to gain more insight in the way these schools shaped their early-English education and what the schools' goal of offering this form of education was. Schools reported that by offering early-English education children could profit from a heightened language sensitivity and they will be prepared for the future, in which being highly proficient in a foreign language will probably come as an advantage. This heightened language sensitivity was mentioned as one of the reasons for the schools to provide early-English education. Finally, a goal of early-English education is to make children more open minded and understanding towards other languages and cultures (Deelder & Maljers, 2007).

From the questionnaire (Persson, 2012), it also became clear that there is tremendous variation in how schools shape their early-English educational programmes. A lot of variability was found in the time that the schools spent on English, the profiles of the schools in terms of for instance denomination and number of students, the number of teachers that taught English in the schools and the proficiency level of the teachers (Persson, 2012), as was also found earlier by Baker (2001). The latter one is an important factor, since most of the curriculum in early-English education is taught by non-native speakers of English (Thijs et al., 2011). For this reason, Unsworth et al. (2015) investigated the influence of the teacher's English language proficiency level on children's receptive grammar and vocabulary size in grade 1 and 2. They found that children taught by non-native teachers with a lower proficiency level on the Common European Framework of Reference (CEFR scale for language proficiency) performed worse on vocabulary tasks. However, children that were taught by high proficient (C-level on the CEFR scale) non-native speakers did not significantly differ from those taught by native speakers. Secondly, they found that the teacher's language proficiency was a better predictor of vocabulary and grammar scores than the time spent on English per week. In another study, Herder & De Bot (2005) state that it might be better to hire non-native teachers, as they experienced the process of learning a second language theirselves and therefore know which difficulties they encountered in their own learning process.

When early-English education first emerged in the Netherlands, concerns about the impact of early-English education arose among for instance the parents of the children involved (Goorhuis-Brouwer & De Bot, 2005). The main concern was whether there would be negative consequences for the children's development of their native language or for their overall development. This led to several studies on the impact of early-English education on the

children's Dutch proficiency level (Goorhuis-Brouwer & de Bot, 2005; Goorhuis-Brouwer & De Bot, 2010; De Bot, 2014). Goorhuis-Brouwer & De Bot (2005) tested children in first and second grade of early-English education on their overall proficiency level of Dutch, using a Reynell test (Van Eldik et al., 1995; Schlichting & Lutje Spelberg, 2003). This is a language comprehension test for children between the age of 1.2 and 6.3 years old which assesses word comprehension and sentence comprehension (Goorhuis-Brouwer & De Bot, 2005). They found that early-English education children did not score any worse on this test than the standard scores for their age group.

As a follow-up on this study, Goorhuis-Brouwer & De Bot (2010) investigated not only language comprehension, but also took language production, again using a Reynell test (Edwards, 1997; van Eldik, 1998), this time assessing both language comprehension and production. Another elaboration of this study in addition to Goorhuis-Brouwer & De Bot (2005) was that they considered both English and Dutch language proficiency level. They found that Dutch children in early-English education showed a strong development in their overall English proficiency and that there were no negative effects on the children's Dutch proficiency level. At the end of the first grade, the children proved to have developed their English to the level of a two-year-old native English toddler (Goorhuis-Brouwer & De Bot, 2010).

Early-English education in the Netherlands thus differs from regular education and from immersion education. The biggest difference is the amount of time spent on English language teaching. A lot of variation exists within schools that offer early-English education, too. In the present study, I will address what the effects of early-English education on phonological awareness are, in relation to vocabulary size. Combined vocabulary size will be included, as this could provide a better representation of bilingual children's overall vocabulary knowledge. Children, namely, may know a word in one language but not in the other. Taking only one of the vocabulary sizes into account therefore provides only a limited view of the child's vocabulary size. To define phonological awareness further, section 1.2 will first focus on phonological awareness development in general.

1.2 Phonological awareness development

As already briefly introduced in the general introduction above, the current study zooms in on the effects that early-English education may have on phonological awareness development. For the present study, some background knowledge, not only on what phonological awareness is in general but also on children's phonological awareness development, is needed. Phonological awareness can be defined as the ability to 'consciously reflect upon phonological segments of spoken words and manipulate these segments in a systematic manner' (Verhoeven, 2007, p. 427). Phonological awareness is, for instance, involved in 'the division of words into phonemes and syllables, the recognition of rhymes, and alliteration, the use of phonemes and syllables from words, and the omission, addition, or replacement of phonemes within words' (Verhoeven, 2007, p. 427). Other than these mentioned aspects phonological awareness can also be involved in judging whether two words have sounds in common (Anthony & Francis, 2005). Phonological awareness thus addresses one's sensitivity to the sound structures of a language (Anthony & Francis, 2005).

As for phonological awareness development, some general developmental patterns have been found (Anthony & Francis, 2005), also known as *the levels of phonological awareness* described by Treiman (1987). First, it has been found that children's sensitivity to sound structures becomes more and more fine-grained. Children become more sensitive to smaller

parts of words as they grow older. For instance, they first develop sensitivity to detect syllables, whereas sensitivity to rhymes and onsets develops only somewhat later. And even after this detection of onsets and rhymes, children become more sensitive to detect phonemes within intrasyllabic word units (Treiman, 1987). Another pattern that has been found with regard to phonological awareness development is that children can distinguish similar sounding words from dissimilar sounding words before being able to manipulate sounds *within* words. In addition, they can combine phonological cues before they can segment them (Anthony et al., 2003). In addition, a difference in development exists between different phonemes. Voiced phonemes are for instance developed prior to voiceless phonemes and therefore phonological awareness to these voiced phonemes is likely to precede phonological awareness to voiceless phonemes (Stage & Wagner, 1992). Finally, Anthony et al. (2003) found that children still further develop previously acquired phonological awareness skills while learning new skills. Hence, phonological awareness development is subject to considerable individual variation, depending on one's language acquisition experience (Anthony & Francis, 2005).

Phonological awareness development can vary across languages. For example, when we consider syllabic awareness, the linguistic environment has been shown to be of great influence. Children who speak languages in which syllables are more salient, e.g. Turkish, Greek and Italian, acquire syllabic awareness earlier than children who are learning a language that has less emphasis on syllables, like French and English (Cossu et al., 1988; Demont & Gombert, 1996; Durgunoglu & Oney, 1999). A reason for this could be that Turkish, Greek and Italian possess clearer syllable boundaries than French and English. Exposure to the native language structures could thus influence phonological awareness ability and thereby decrease the ability to detect certain structures that may, in contrast, be very characteristic and typical for phonological awareness development in other languages.

On the contrary, an aspect of phonological awareness development that is universal is the boost the phonological awareness skills get when children start to receive literacy instruction, that is, when they start to learn how to read (Anthony & Francis, 2005). At that point, children acquire the alphabet and become capable to map spelling onto the sounds of the language they know, which makes them more aware of the phonological system of their language. Still, it is important to keep in mind that the exact shape of this acceleration in phonological awareness skills depends on the type of alphabet the child learns. Mann (1986) for instance compared phonological awareness development in Japanese and American English learning children, since Japanese uses an alphabet that consists of characters that represent syllables whereas American English uses and alphabet that consists of letters that represent phonemes. Japanese learning children appeared to be more sensitive to syllables, while American English learning children were to phonemes, which was attributed to the differences in the alphabetic characters.

In addition to the aforementioned finding that phonological awareness accelerates when learning to read, prior studies have also found phonological awareness to be an important predictor of literacy acquisition (e.g. Carroll et al., 2003; Mann & Liberman, 1984; Stahl & Murray, 1994; Wagner & Torgesen, 1987). A study by Stahl and Murray (1994) investigated a large number of kindergarteners and first graders and proved that alphabet knowledge was required for them to distinguish onsets and rhymes. In turn, increased alphabet knowledge may lead to increased reading skills too. Another study by Carroll et al. (2003) investigated the role of letter knowledge on phoneme awareness in a longitudinal design looking at 3 to 4-year-olds (Carroll et al., 2003: experiment 4, study 1). It appeared that letter learning positively correlated with phoneme awareness, once again evidence for a relation between phonological awareness and reading ability. Children that had acquired more letters showed increasingly higher phoneme awareness skills than children with a weaker knowledge of letters. In this study,

children who had no letter knowledge whatsoever were even found to have no phoneme awareness at all (note: this does only consider phoneme awareness and does not mean no other phonological awareness skills are present yet). However, we do have to be critical in accepting these findings, as most of the studies on the relationship between phonological awareness and literacy development did not take prior literacy skills into account. For instance, if participants had older siblings, they may have acquired some literacy knowledge before starting kindergarten already. A review by Castles and Coltheart (2004) argues that previous studies should have controlled for existing literacy skills more and that we should keep this in mind when interpreting their outcomes.

Another factor that should be kept in mind when assessing phonological awareness is memory (Oakhill & Kyle, 2000). The tasks that are generally used to assess phonological awareness skills have a high memory demand. Let us look at a task called phoneme deletion as an example. In this task, children hear for instance three words followed by one of those words with an extra phoneme. The experimenter names the phoneme that has to be deleted and the child is asked to choose what word remains (out of the three mentioned words). Children who have a better memory command are more likely to remember the previously named words better. Consequently, they are more likely to connect the word with the phoneme deletion to the right option. Children who have a poor memory command may not remember the previously mentioned options, which may cause them to give an incorrect response.

As phonological awareness is related to reading ability it is an important matter for research, since it could be of influence on children's educational development. In the present study, the effects of early-English education, and thereby the effects of learning a second language, on phonological awareness are addressed. As becomes clear from the previously mentioned studies, phonological awareness development varies between languages and is dependent on the child's native language (Cossu et al., 1988; Demont & Gombert, 1996; Durgunoglu & Oney, 1999). Therefore, being bilingual or learning a second language could affect children's phonological awareness skills. What the exact influence of being bilingual is with respect to phonological awareness will be discussed in the following paragraph.

1.3 The role of bilingualism on phonological awareness

Previous studies provided evidence for the claim that bilingualism facilitates phonological awareness. For instance, in a study conducted by Chen et al. (2004), Cantonese-Mandarin bilingual children were found to have phonological awareness advantages in tone, onset and rhyme awareness tasks over Mandarin speaking monolingual children. Chen et al. (2004) state that this bilingual benefit in phonological awareness is likely to be due to the contrast between the two languages, which makes them pay more attention to the phonology of the words they learn (Tingley et al., 2004). On the contrary, monolingual children are more likely to focus on semantic aspects of the words they learn, they tend to pay more attention to meaning rather than phonology.

Campbell & Sais (1995) found the same effect by comparing 5-year-old English monolingual children to Italian-English bilingual children, in the sense that the Italian-English children outperformed the English monolingual children in morpheme deletion, syllable deletion, letter deletion and sound sorting phonological awareness tasks. Moreover, the bilingual children were slightly younger than the monolingual children, which makes the effect even stronger. Bialystok, Majumder & Martin (2003) investigated the role of bilingualism on phonological awareness, thereby also considering the influence that different languages may

have. They compared monolingual English children, Chinese-English bilingual children as well as Spanish-English bilingual children, all raised fully bilingual, in a longitudinal design. The children were tested at three points in time: first, just before literacy instruction, second when just having started learning to read, and finally, in the early stages of reading. So, the moments of testing were in kindergarten, Grade 1 and Grade 2, respectively. The authors did not find a consistent effect of bilingualism on phonological awareness (Bialystok et al., 2003: experiment 3). They found that English-Spanish bilinguals outperformed the monolingual English speaking children on a phoneme segmentation task, but that Chinese-English bilinguals, in contrast, were outperformed by the monolinguals. Furthermore, they tested additional phonological awareness tasks (a sound-meaning task, a phoneme substitution task and a word identification task and a word attack subtest), but no differences between the groups were found in these tasks. Therefore, they argue that being bilingual in specific languages may affect phonological awareness more than bilingualism in general. They conclude that the combination of Chinese and English might not have been the most optimal group to include in the study design, because phonological awareness is a precursor to reading and Chinese has a very distinct phonological and orthographical system than English. This is also in line with the findings from Mann (1986) on Japanese and American English monolinguals, who found that monolinguals' phonological awareness development differed between different languages, because of their different alphabetic systems. Japanese monolingual children were more sensitive to syllables whereas American English monolingual children were to phonemes. Mann (1986) thus concluded that different alphabets affect children's monolingual phonological awareness development differently. Following this line of reasoning, Bialystok et al. (2003) argue that effects, in their study, may probably appear when taking other languages into consideration, i.e. languages that are more similar in grapheme systems.

Apart from the alphabet, a language's complexity can also influence phonological awareness skills in bilinguals. Loizou and Stuart (2003) found an effect of the considered languages' complexity in their study, comparing bilingual children's phonological awareness skills. Four groups of participants were compared: Greek-English bilinguals living in Cyprus, English-Greek bilinguals living in England, Greek monolinguals living in Cyprus and English monolinguals living in England. All groups performed a battery of six phonological tasks, involving phoneme identification, phoneme elision, rhyme and onset tasks, and a vocabulary task in English and Greek. The English-Greek bilinguals were compared to the English monolingual children and the Greek-English bilinguals were compared to the Greek monolingual children. The English-Greek bilinguals showed better developed phonological awareness than their monolingual peers but the Greek-English bilinguals did not outperform their Greek monolingual peers. The authors argue this effect to follow from the 'bilingual enhancement effect', which implies that bilinguals only outperform monolinguals in phonological awareness if their second language is phonologically less complex than the first. In this case, English is the more complex language and therefore the bilingual advantage does not occur for Greek-English bilinguals over Greek monolinguals (Loizou & Stuart, 2003).

Finally, Kuo and Anderson (2010) state that we should keep in mind that phonological segments and syllable structures are two different aspects of phonological awareness which can vary a lot between languages. Kuo and Anderson (2010) argue that this should be taken into account when choosing phonological awareness tasks to assess in a study. Languages may namely differ in structure and alphabet, for instance tonal languages versus non-tonal languages or languages that have an alphabet in which a unit is a word opposed to languages in which a unit is a letter, and this is likely to influence participants' phonological awareness skills between languages.

Hence, what we can conclude from the previously discussed studies is that there seems to be a benefit for bilinguals in phonological awareness skills. However, we should keep the complexity and the alphabet of the languages concerned in mind. The following paragraph will zoom in on studies that addressed the effects of immersion education on phonological awareness, to follow up on the effects of bilingualism on phonological awareness as have been discussed in this paragraph.

1.4 The role of immersion education on phonological awareness

Not only the role of bilingualism on phonological awareness skills has been investigated. Although relatively limited in scope, research has also considered the role of immersion education on phonological awareness. Children attending immersion education are solely exposed to a foreign language in their education. However, the exposure to this additional language is typically less than the exposure simultaneous bilinguals get, because simultaneous bilinguals are mostly raised from birth by parents with two different native languages, or speak one language at home and another at school. The question thus is whether children who are less exposed to a second language, still show advantages in phonological awareness development. By comparing 5 to 6-year-old English monolingual children in regular English schools and 5 to 6-year-old English children in French immersion schools, Bruck and Genesee (1995) showed that immersion education pupils, despite having less exposure than simultaneous bilinguals, already had an advantage in phonological awareness skills over monolingual children. However, this advantage disappeared after a year of attending this type of education. Furthermore, this initial advantage only held for certain aspects of phonological awareness. For instance, there was a difference when looking at onset-rhyme awareness but no differences were found in syllable awareness or phoneme awareness. However, the authors doubt whether or not this effect can really be explained as being caused by being bilingual. They speculate that this difference can also be due to the prosodic differences in the languages: French has more emphasis on prosodic patterns whereas English has more emphasis on stress. This could have caused the French immersion education children's advantage on the onset-rhyme awareness.

Bruck and Genesee (1995) thus analysed three levels of phonological awareness: syllables, onsets and rhymes, and phonemes. An older study by Rubin and Turner (1989) took these levels together and tested immersion education children on their overall phonological awareness ability without performing different statistical analyses over the different tasks. They considered English first graders in French immersion schools and followed them for two years. Rubin and Turner (1989) found that the children enrolled in French immersion education programmes outperformed the children in regular monolingual English education programmes after two years of French instruction, whereas they did not differ before the immersion education exposure. A debate has been ongoing on whether children's performance on phonological awareness tasks should be analysed separately, i.e. per task, or taken together. Tingley et al. (2004) conclude that the results from the Rubin & Turner (1989) study are probably too broad and argue that separating the different tasks allows us to interpret the data more thoroughly.

Tingley et al. (2004) extended the study by Bruck and Genesee (1995) in the sense that they chose English regular education schools and French immersion education schools in an area in which English was the standard societal language. Prior studies, like Bruck & Genesee (1995), always focused on schools in regions where both English and French were common languages in society, for instance in Quebec, Canada. By choosing an English area instead,

Tingley et al. (2004) ruled out possible effects of out-of-school exposure in both languages. Another addition to Bruck and Genesee (1995) was that Tingley et al. (2004) also assessed phonological awareness in French, the language of immersion, to get a more complete view. Specifically, this was done because of the onset-rhyme advantages that were found for French before. Their results showed that all children's phonological awareness skills were enhanced after a year of education, regardless of whether attending French immersion or English regular education, but only in onset and rhyme awareness and not in syllable awareness. They thus did not find the same pattern as Bruck and Genesee (1995) but only found a more general pattern of children's overall phonological awareness development.

Another longitudinal study, concerning English speaking monolingual children and Korean speaking children in English immersion education revealed that, initially, the Korean pupils in grade 1 outperformed the English monolinguals on a set of phonological awareness tasks (Chiappe et al., 2007). However, like in the former study, this advantage disappeared towards the end of grade 1 as well. More evidence for this trend of an initial advantage that later on disappeared was also provided by a study by Yelland, Pollard and Mercuri (1993). They investigated two groups of first graders: the first group were monolingual English children and the second group consisted of English children enrolled in a 6-month Italian education programme. After only 6 months already, the Italian-learning group showed an advantage on word awareness, as assessed by a word size judgment task. This advantage disappeared towards the end of the first grade, just like the advantages in phonological awareness in the majority of the studies discussed previously.

However, phonological awareness has not been assessed for early-English education instead of immersion education. It is important to also investigate the impact early-English education has on phonological awareness skills because we cannot generalise the effects of immersion education to early-English education, since there is a large difference in the amount of exposure to the foreign language. In this study, we investigate whether children who are exposed to English as little as a couple of hours a week already show a phonological awareness advantage when compared to children who are attending regular education and who are less or not exposed to English. Furthermore, by investigating the effects of early-English education specifically, this will allow us to gain more knowledge on the consequences of early-English education for Dutch children specifically.

1.5 The role of vocabulary size on phonological awareness

Apart from bilingualism or immersion education, vocabulary size has also been shown to affect phonological awareness. In a study by Metsala (1999), English monolingual children were tested on their vocabulary size and their phonological awareness skills. Participants possessing a considerably larger vocabulary size on the Peabody Picture Vocabulary Task (Dunn & Dunn, 1997) scored higher on the phonological awareness tasks too. Chiang & Rvachew (2007) argued that a big vocabulary size is required for phonological awareness, since a child needs to be able to produce a word in order to be able to adapt it in tasks like phoneme deletion. In a study on English-French immersion education children's vocabulary size and phonological awareness, they found that vocabulary size was beneficial for phonological awareness, similar to Metsala (1999). These children's English vocabulary size explained their phonological awareness skills in English in the sense that the bigger their vocabulary size, the better their phonological awareness skills. This effect also held for their L2 French, where the effects were even stronger.

That is, French vocabulary size also explained their phonological awareness skills in French, and this effect was greater than in English.

Rolla et al. (2006) also investigated how vocabulary size and phonological awareness correlated. They tested unbalanced Spanish-English bilingual children in kindergarten and first grade receiving either Spanish or English literacy instruction and monolingual children receiving English literacy instruction. The participants were tested on their vocabulary size using a Woodcock Language Proficiency Battery (Woodcock, 1991). Phonological awareness was tested by a phonemic segmentation task in English, in which the participants had to segment words that contained diphthongs. Rolla et al. (2006) found that children with a higher vocabulary size in their more dominant language, whether Spanish or English, performed better on English phonemic segmentation than their peers with a lower vocabulary size. The L1 thus needed to be well developed for the advantage in phonological awareness to appear (Cummins, 1979). Rolla et al. (2006) state that if the L1 vocabulary development is slow or the vocabulary size is small, then the L2 vocabulary development should be extra strong to still yield the enhanced L2 phonological awareness development effect. It thus seems important to include vocabulary size in studies investigating advantages in phonological awareness.

1.6 The role of bilingualism on vocabulary size (development)

In contrast to the positive effects that bilingualism may have on phonological awareness, bilingualism seems to be negatively related to vocabulary size. That is, bilinguals are likely to possess a smaller vocabulary size than monolinguals in either language (e.g. Bialystok et al., 2010; Doyle et al., 1997; De Houwer, Bornstein & Putnick, 2013). In the following, I will discuss a number of studies that revealed this negative relationship.

Bialystok et al. (2010) performed a meta-analysis on a number of previously conducted studies that compared monolinguals and bilinguals with regard to their vocabulary sizes. They argue that these previous studies all had relatively small sample sizes and therefore a bigger analysis would be necessary. For that reason, they collapsed data from a number of earlier studies, allowing them to have a sample size of over 1700 bilingual and monolingual children, ranging from 3 to 10 years of age. The analysis showed that bilinguals' comprehensive vocabulary scores were significantly lower than the monolinguals', in all age groups, from 3 to 10 years old.

De Houwer et al. (2013) found this difference in vocabulary size to even already exist in 20-month-old bilinguals versus monolinguals. They compared Dutch-French bilingual toddlers to monolingual Dutch toddlers. Both groups were matched on environmental factors like socioeconomic status and exposure. Comprehensive and productive vocabulary size were measured through parental reports on the children's vocabulary knowledge, by means of the MacArthur-Bates Communicative Development Inventory (N-CDI) for Dutch vocabulary knowledge (Zink & Lejaegere, 2002). The 20-month-old monolingual Dutch toddlers appeared to know more Dutch words than their bilingual peers.

In sum, bilinguals appear to have a smaller vocabulary size than monolinguals. However, in the studies mentioned above, this was only tested at one time point. A study that assessed vocabulary size in a longitudinal design was performed by Vagh, Pan & Mancilla-Martinez (2009). As for the vocabulary growth rate, they found that monolingual children were faster in their vocabulary growth. They assessed English-Spanish bilinguals' and English monolinguals' vocabulary size by using the CDI (Fenson et al., 2007). They asked parents as well as teachers to fill out this questionnaire at five time points: at the age of 24 months, 27

months, 30 months, 33 months and 36 months. Their results revealed that the English monolingual participants' vocabulary size growth rate was significantly faster than the Spanish-English bilinguals'. After 36 months, the bilingual participants still stayed behind compared to the monolingual participants.

When expanding this vocabulary development difference between monolinguals and bilinguals to adulthood, it was found that even adult bilinguals to some extent still show a disadvantage when compared to monolingual adults in their vocabulary size (Bialystok, Craik & Luk, 2008). This finding indicates that bilinguals know fewer words than their monolingual peers in one of their two languages.

However, a flaw in all of the highlighted studies is that they only assessed the vocabulary size in one of the languages, i.e. the language that the bilinguals and the monolinguals had in common. We should note that bilinguals might use one language in different contexts than the other language, which means that we should not look at bilinguals' separate vocabulary sizes but that their vocabularies of the two languages should maybe be taken together to shape a better representation of their overall vocabulary size (e.g. Pearson, Ferncindez & Oller, 1993; Bialystok et al., 2010). This is called the complementary principle (Grosjean, 2010). When bilinguals use one of their languages in a specific context only, their vocabulary size is likely to be smaller because it only consists of the words that are relevant for that context. In that case, they thus tend to distribute their vocabulary knowledge over the two languages. Therefore, assessing vocabulary size in only one language may provide an incorrect representation in terms of a bilingual's overall vocabulary size. For that reason, the current study will sum both vocabulary sizes, to get a more correct representation of the vocabulary size.

In addition, we should be careful in interpreting studies that claim to compare monolingual and bilingual children, as De Houwer et al. (2013) state that the vast majority of the previously mentioned studies did not consider comparable groups of monolinguals and bilinguals. Groups could have been kept more comparable by controlling for factors like socioeconomic status and the parents' educational level, in order to be able to make valid comparisons between monolinguals' and bilinguals' vocabulary sizes. These factors, namely, may influence the input that the children receive, which is likely to result in different vocabulary scores. The present study will control for this by choosing participants that are selected by their school profile, schools with families of comparable average income, the same religion and a comparable number of children with delay in language development.

In sum, it becomes clear that bilinguals possess a smaller vocabulary size in the language that the monolinguals and bilinguals have in common (e.g. Bialystok et al., 2010; Doyle et al., 1997; De Houwer, Bornstein & Putnick, 2013). For the influence of immersion education on vocabulary size, on the contrary, the outcomes were a lot more variable. Bruck and Genesee (1995), for instance, did not find any difference in the vocabulary size of immersion education pupils compared to monolingual school pupils in their L1 vocabulary sizes. Bialystok et al. (2003) found that Chinese-English immersion education children had a smaller vocabulary size in English than monolingual English children, although this difference was not as big as the difference between bilingual children's and monolingual children's vocabulary sizes. However, when they compared Spanish-English immersion education children to monolingual English children, there was no significant difference in English vocabulary size. Thus, we can conclude that research has shown that bilinguals generally possess a smaller vocabulary size than monolinguals in the language that they have in common, but that studies on immersion education pupils' vocabulary size compared to monolingual pupils' vocabulary size did not yield clear consensus in their results.

1.7 The problem/contradiction

The three effects observed in previous studies, i.e. the negative relation between bilingualism and vocabulary size, the positive relation between bilingualism and phonological awareness, and the positive relation between vocabulary size and phonological awareness, thus seem to evoke a contradiction. That is, bilinguals are likely to possess a smaller vocabulary size, a smaller vocabulary size could hinder phonological awareness and, finally, bilingualism may facilitate phonological awareness. This can be seen in Bruck & Genesee (1995) and Chiappe et al. (2007), who combined the three factors vocabulary size, immersion education and phonological awareness in their analyses. In both studies, the immersion education children outperformed the regular education children and, although limited, a difference in vocabulary size was found. Although being bilingual thus could mean having a smaller vocabulary size and, in relation to that, having less developed phonological awareness skills, the opposite was found in several studies (Campbell & Sais, 1995; Chen et al., 2004; Chiang & Rvachew, 2007; Metsala, 1999), as bilingual and immersion education children outperformed monolingual children in their phonological awareness skills.

Two possible options for explaining this surprising effect are as follows: either bilingualism is a better predictor of phonological awareness than vocabulary size, or the previous studies were incorrect in only taking the vocabulary size of the language in which phonological awareness was tested into their analysis (e.g. Bialystok et al., 2003; Bialystok et al., 2010; Campbell & Sais, 1995; Chiappe et al., 2007). These studies namely concerned only the language that was the common factor between the control group (regular education, monolinguals) and the test group (immersion education, bilinguals). Instead, perhaps overall vocabulary size, taking the vocabulary size of the L1 as well as the L2 together, is what counts most for phonological awareness. If we were to take the combined vocabulary size into the analyses in the current study, then the contradictory findings from the previous studies might disappear, as bilinguals would then perhaps have a bigger vocabulary size, which, in turn, would induce better phonological awareness scores.

1.8 The present study and the research questions

In the present study, I will examine the impact that early-English education has on children's phonological awareness development. Furthermore, I will evaluate what the relationship between these phonological awareness skills and the children's vocabulary size is, both in control schools and in early-English education. I will investigate the possible explanations for the contradiction given above by analysing vocabulary development in the L1, the L2 and, finally, by also taking into account the combined vocabulary size of the L1 and the L2.

In addition, I will control for the children's verbal short term memory abilities, as some studies have shown these abilities are related to (at least some aspects of) phonological awareness (e.g. Oakhill & Kyle, 2000). I will do this in order to be able to make valid inferences about the effects of early-English education and vocabulary size on phonological awareness and to make sure that the effects are not unexpectedly influenced by verbal short term memory.

The main research question is as follows: is the relationship between vocabulary size development and phonological awareness the same in L1 Dutch children in early-English education as it is for L1 Dutch children in regular education, in grade 1 and 2 in primary school?

This question will be addressed by answering three sub-questions. First, it will be examined to what extent Dutch children in early-English education differ from Dutch children in monolingual schools in their phonological awareness. Second, I will investigate to what extent Dutch children in early-English education differ from Dutch children in monolingual schools in their vocabulary size in Dutch and in English, in their separate vocabulary sizes as well as when Dutch and English were taken together as a combined vocabulary measure. Finally, the question will be addressed whether the relationship between phonological awareness skills and vocabulary size differs between Dutch children attending early-English education and Dutch children attending monolingual education.

1.9 Hypotheses

As for the first sub-question, based on previous research (Bruck & Genesee, 1995; Chiappe et al., 2007), I hypothesise that Dutch children in early-English education will initially (grade 1) outperform monolingual Dutch children in regular education in their phonological awareness skills, but I expect this effect to decrease over time (grade 2).

Concerning the second sub-question, I expect to find no significant differences in Dutch vocabulary size between children attending early-English education compared to children attending regular Dutch education. Previous studies already considered the comparison between early-English education children and regular education children in their Dutch language comprehension and overall proficiency and found that early-English education did not negatively influence L1 Dutch proficiency (de Bot, 2014; Goorhuis-Brouwer & de Bot, 2005; Goorhuis-Brouwer & de Bot, 2010). However, these studies focused on overall proficiency and hence, their conclusions, based on overall proficiency, do not generalise to vocabulary size in particular. Nevertheless, their conclusions do say something about the impacts of early-English education on L1 Dutch, namely that no negative effects on L1 vocabulary size are expected. Furthermore, as mentioned before, the studies examining the influence of immersion education on vocabulary size showed variable outcomes and argued that this variety may be depending on the language chosen (Bialystok et al., 2003; Bruck & Genesee, 1995). Since early-English children received even less exposure than the immersion education children in prior studies, I have no reason to expect a significant difference in L1 vocabulary size in early-English education compared to regular education.

With regard to their English vocabulary size, I expect the early-English children to outperform the children attending regular education, since the early-English children received English lessons at school whereas the children in regular education did not. I anticipate this because previous studies, (e.g. Goorhuis-Brouwer & de Bot, 2010; Unsworth et al., 2015), already found a positive effect of early-English education in the Netherlands on English proficiency. Finally, as for their combined vocabulary size, i.e. taking their English and Dutch vocabulary size together, I expect the early-English education children to possess a larger overall vocabulary size than the children in regular education. I thus expect the vocabulary size in both English vocabulary and the vocabulary size in combined vocabulary size to be larger in early-English children, because these children were more exposed to English.

Finally, what I anticipate regarding the third sub-question is the following. Prior studies on the relationship between phonological awareness and vocabulary size of children in

immersion education only considered one of either language's vocabulary size (e.g. Chiappe et al., 2007). This one language's vocabulary size failed to be a very clear predictor for phonological awareness. However, these studies did not take both L1 and L2 vocabulary size together, combined. Therefore, I expect the differences in phonological awareness that I predicted to find for sub-question 1, namely that early-English children would be better in phonological awareness than monolingual children, to be due to overall vocabulary size, instead of vocabulary size of either language. The reason for expecting this is because previous studies on immersion education thus did not find a clear relationship between vocabulary size in the native language and phonological awareness but that other previous studies have shown a bigger vocabulary size to be a predictor for better phonological awareness skills. For that reason, the vocabulary size of one of the language that the bilingual and monolingual participants have in common only may not be enough to show a positive effect on phonological awareness, but, in contrast, the overall vocabulary size may be.

2. Methods

2.1 Design

Two ANCOVA's and three ANOVA's were conducted. Furthermore, depending on the outcomes of the first analyses a mediation analysis or multiple regression analyses were conducted. I will discuss these separately in the data-analysis section, 2.5.

The dependent variables that were used in these statistical analyses were Phonological awareness (Rhyming, Synthesis) and Vocabulary size (Dutch, English and combined). The independent variables were Type of Education (regular education or early-English education) and Grade (grade 1 and grade 2). Short-term Memory was added as a covariate, to control for possible effects of differences in memory ability on the dependent variables. If one child for instance has a better short-term memory, they will probably be better at remembering the words in the tasks which may cause them to base their answers on that and outperform the children with a worse command of short-term memory. That would decrease the reliability of the outcomes of the study.

The analyses required a 2x2 between-subjects design, as four groups were compared: early-English education children in grade 1, regular education children in grade 1, early-English education children in grade 2 and regular education children in grade 2. A schematic overview of these four groups can be seen in Table 1. All groups performed the same tasks.

Table 1. *Division of the Groups.*

	Early-English education	Regular education
Grade 1	**Group A**	**Group B**
Grade 2	**Group C**	**Group D**

2.2 Materials/stimuli

To assess the research questions, pupils' phonological awareness, vocabulary size and verbal short-term memory were tested. To accomplish this, the following tasks/materials were used. For each task, I will provide a stimulus item below as an example. The general procedure of the testing session as a whole will be further explained in section 2.4.

2.2.1 Phonological awareness

To test phonological awareness, two aspects were chosen, Rhyming and Synthesis, since these are tasks that are in general in accordance with first and second grade level of primary school and therefore appropriate for this group of participants.

Both tasks were part of the Cito Screeningsinstrument Beginnende Geletterdheid (Instrument of Screening Early Literacy), which has been shown to be of a sufficient level of validity and reliability when it comes to phonological awareness (Vloedgraven, Keuning & Verhoeven, 2011). I will describe both tasks below.

2.2.1.1 Rhyming

The rhyming task aimed to test participants' ability to detect words that rhyme with each other. First, the experimenter would explain to the child that two words rhyme when they sound the same at the end and give an example of two rhyming words, to ensure the participant knew what was meant by rhyming. To start, two practice items appeared, which served to familiarise the participants with what they would have to do and to avoid any unwanted effects, for example because of the children having to get used to the setting. After the practice trials, 15 experimental trials appeared.

In all trials, participants were presented with three pictures of concepts, accompanied by their spoken form, one picture and sound appearing at a time. After having looked at all three pictures and having listened to the words, the sound of a novel word would play, which rhymed with one of the three picture words. The participant was asked to choose which of the three picture words rhymed with the novel word. All words were monosyllabic and consisted of three letters in the pattern CVC (consonant – vowel – consonant) or four letters in the pattern CVVC (consonant – diphthong – consonant). The rhyming task took about 5 minutes. The score was the number of correctly answered items.

An example item of the Rhyming task has been added in Figure 1 below.

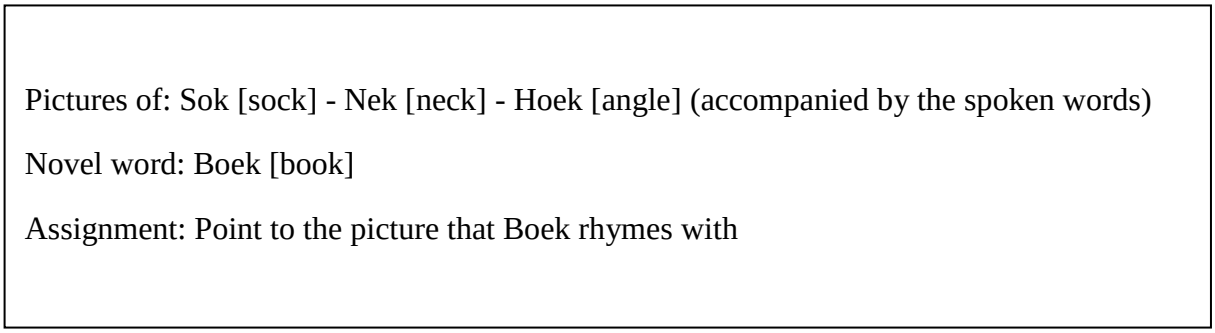

Figure 1. An Example Item of the Rhyming Task.

2.2.1.2 Synthesis

The aim of the Synthesis task was to test participants' ability to constitute new words out of separate sounds. Like in the Rhyming task, this task started with two training items as well. Afterwards, 15 test items followed. In the trials, participants were presented with three pictures of concepts accompanied by the spoken word for that concept, one picture and sound at a time. After having looked at all three pictures and having listened to the words, the sound of one of three pictures was repeated, divided into chunks. All words were monosyllabic and consisted of three letters in the pattern CVC (consonant – vowel – consonant) or four letters in the pattern CVVC (consonant – diphthong – consonant). When the words were divided into chunks, the division always had the patterns /C/ /V/ /C/ or /C/ /VV/ /C/ and the words were never separated in another place in the word. The participant's task was to choose to which word the chunks belonged, by combining the chunks to make the word. The duration of this task was around 5 minutes. In this task too, the score was the amount of correctly answered items.

An example item of the Synthesis task has been added in Figure 2 below.

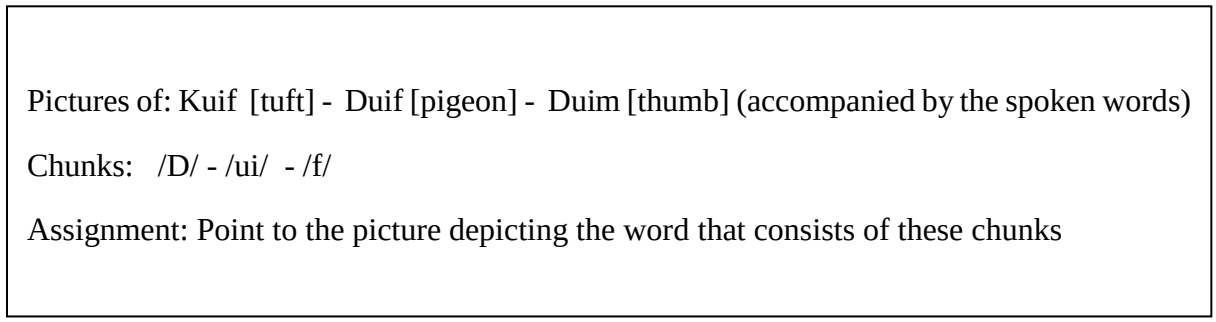

Figure 2. An Example Stimulus Item of the Synthesis Task.

An example of what the Rhyming and Synthesis tasks look like can be found in Figure 3 (Cito, 2013). Children see the pictures and hear the accompanying words (written below the pictures in Figure 3).

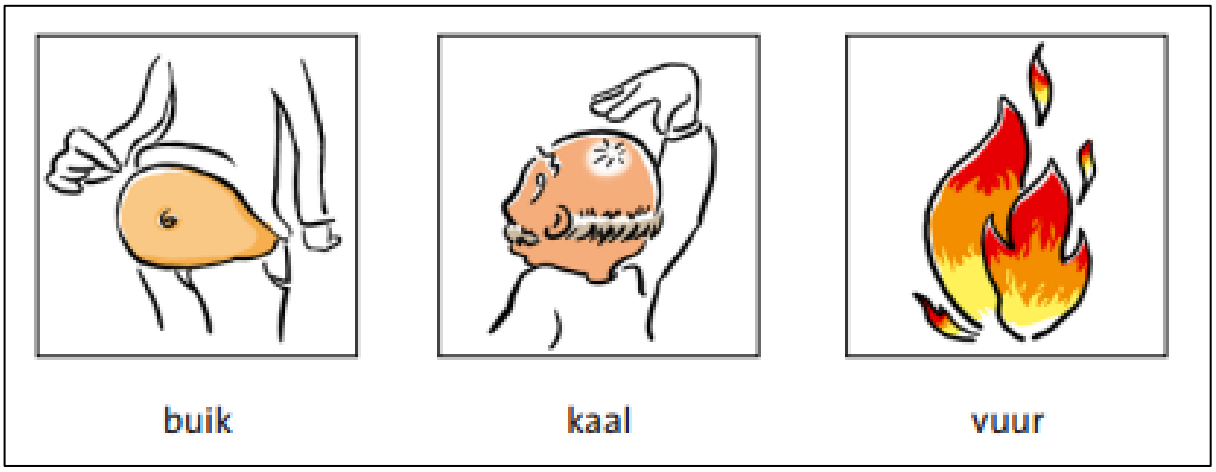

Figure 3. A Stimulus Item Example for the Rhyming Task, from the Cito Screeningsinstrument Voor Beginnende Geletterdheid.

2.2.2. Vocabulary size

To test vocabulary size, the Peabody Picture Vocabulary Test (Dunn & Dunn, 2005; Dunn & Dunn, 2007) was chosen (for English: PPVT-4 and for Dutch: PPVT-III-NL), because this task was used in previous studies and those studies showed that it was an appropriate method for measuring vocabulary size (Bialystok et al., 2003; Bialystok et al., 2010; Bruck & Genesee, 1995). Besides, the English and Dutch version have both been shown to be reliable (Dunn & Dunn, 2005; Dunn & Dunn, 2007). As with the split-half reliability coefficients, which can be defined as the degree of consistency of performance on different sections of a test, the PPVT was proved to be very reliable. For English, the reliability coefficients, alpha's, were on average .97. This average was calculated for Form A only. The PPVT is divided into two forms, two versions, to rule out learning effects in repeated measures studies. The current study did not conduct the PPVT twice and therefore only used Form A. For Form A in the English PPVT, the reliability alpha's for the ages that the current study considered (4:00-6:22), were on average .96. As for the Dutch PPVT in Form A, the reliability coefficients were measured in lambda's (Guttman, 1945). The lambda measures for the ages from 4:00 to 6:22 for the Dutch PPVT were on average .93. Reliability is measured on a score from 0 to 1.0, in which 0 stands for *no precision at all* and 1.0 means *free of error.* As the reliability scores found for the PPVT were close to 1.0, this means that the Peabody Picture Vocabulary Test can be concluded to be a reliable test.

Each vocabulary task took approximately 10 minutes. In the vocabulary tasks, participants were first provided with practice items, 3 for English and 4 for Dutch. After those, the test items would follow, grouped in sets of 12. 4 pictures were presented on the computer screen. The participants heard a word and their task was to choose the suitable word for the spoken word out of the four pictures.

The English task existed of 204 items, the Dutch task contained 228 items. Both were divided into sets of 12 items. The start set depended on the child's age. When the child made more than a certain number of mistakes, the set below the start set was conducted. This continued until the child reached the basal set. The basal set thus was determined by the set in which they made a certain number of mistakes. For English, this basal set was determined by the set in which they made 1 mistake at most, for Dutch, this was the set in which they made 4 mistakes at most. After this basal set, the testing session would continue with more sets until they made a certain number of mistakes again (8 for English, 9 for Dutch). When this number was reached, the researcher stopped the PPVT test. The total score was calculated by subtracting the number of mistakes from the number of the highest item they completed. This was done since the highest item they reached could differ between the children, but even if they did reach the same highest item, the number of items they made could differ. The number of items they completed namely also depends on the number of sets they did.

2.2.3. Verbal short-term memory

To assess verbal short-term memory, a Word Span task was conducted, as described by for instance De Hoog et al. (2016). This task took around 5 minutes. Children were presented with an auditory string of words, spoken by the experimenter, and were asked to repeat the words they heard in the same order. The difficulty of the task increased, that is, the strings were elongated after every second string the child, whether or not correctly, repeated. They thus received two strings of the same length before increasing in length. There were 12 strings of words to repeat. All words were monosyllabic and consisted of three letters in the pattern CVC (consonant – vowel – consonant) or four letters in the pattern CVVC (consonant – diphthong – consonant). Participants started with a string of 2 words and the task ended when they incorrectly remembered 4 strings in a row. The maximum number of words to remember was 7. The final score was the amount of correctly remembered strings.

This verbal memory task was preferred over a non-verbal task, because phonological awareness also addresses verbal tasks (synthesis and rhyming), and therefore, if short-term memory would have an influence, it would be more likely to be found when taking verbal short-term memory as a covariate than non-verbal short-term memory.

An example of an elongation of a string of words in the Word Span task can be seen in Figure 4 below.

1	tak	wip	
2	mes	kam	
3	boot	zon	pet

Figure 4. Example of the First Three Strings in the Word Span task.

2.3 Participants

Participants were recruited by visiting 9 schools in the Netherlands, of which 4 were early-

English education schools and 5 were regular education schools. The experiment was conducted among 151 Dutch speaking children, of which 73 were attending regular education schools and 78 were attending early-English education schools. Of the regular education children, 32 were in 1st grade of primary school and 41 in 2nd grade. Of the early-English education children, 38 were in 1st grade and 40 were in 2nd grade. A total of 79 of the participants were male and 72 were female.

The children in grade 1 in regular education and the children in grade 1 in early-English education were between 4 and 5 years old. The children in grade 2 in regular education and the children in grade 2 in early-English education were between 5 and 6 years old. Table 2 provides an overview of the participants' ages. All children had acquired Dutch as their first language, did not speak any other languages and had no developmental problems.

First, early-English schools were acquired. After that, regular education schools were matched to the early-English education schools on number of pupils and denomination, to make sure the schools were as comparable as possible. After this selection procedure, they were being called and subsequently received an information letter. Schools participated voluntarily. The participating children were randomly selected by their teacher.

Table 2. *Participants' ages.*

		N	Minimum age (in years)	Maximum age	Mean age	Standard deviation age
GRADE 1	**Regular education**	32	4.0	5.0	4.4	0.5
	Early-English education	38	4.0	5.0	4.5	0.5
GRADE 2	**Regular education**	41	5.1	6.2	5.5	0.5
	Early-English education	40	5.0	6.1	5.4	0.5

2.4 Procedure

The experiment has been conducted in the schools of the participants. The experimenter first shortly introduced herself to the pupils in a general talk in class. Afterwards, participants were

asked to follow her to a separate room, individually. Participants were tested in a quiet room in the school. Participants were seated in front of a laptop. They performed several tasks, in an established order: Short-term Memory, Nonverbal Working Memory, English Vocabulary (session 1; 20 minutes), Phonological Awareness (Rhyming and Synthesis, and Blending for Grade 2 pupils) and Dutch Vocabulary (session 2; 20 minutes). Synthesis and Rhyming were conducted in Dutch for all participants. Vocabulary tasks were conducted in Dutch as well as in English (depending on the language being tested). Verbal Short Term Memory was conducted in Dutch.

An important thing to note is that the present study was part of a bigger project in which a number of tasks were conducted, as described in the given order above. However, in my analyses I will solely consider a selection of these tasks, only the ones that were relevant for my research questions.

2.5 Data-analysis

As introduced in section 2.1, I conducted several statistical analyses. Since these are used to answer the sub-questions separately, I will discuss the analyses per sub-question below.

Sub-question 1:

This question considered the extent to which Dutch children in early-English education differ from Dutch children in monolingual schools in their phonological awareness skills. For this question, I conducted two analyses of covariance (ANCOVA). The dependent variable for the first ANCOVA was Rhyming and the dependent variable for the second ANCOVA was Synthesis. The independent variables were Type of Education (two levels: early-English education versus monolingual education) and Grade (two levels: grade 1 and grade 2). As a covariate, I added the variable Verbal Short-term Memory, to control for possible effects of this factor on phonological awareness skills.

Sub-question 2:

The second question considered the extent to which Dutch children in early-English education differ from Dutch children in monolingual schools in their vocabulary size. The statistical analysis for this sub-question consisted of three separate ANOVAs, because three types of vocabulary were taken into account (English vocabulary, Dutch vocabulary and combined vocabulary). The dependent variable for the first ANOVA therefore was English vocabulary size. The dependent variable for the second ANOVA was Dutch vocabulary and for the third ANOVA the dependent variable was the combined vocabulary size, taking both vocabulary sizes together. The independent variables were type of education (two levels: early-English education versus monolingual education) and grade (two levels: grade 1 and 2).

Sub-question 3:

The last sub-question considered whether the relationship between phonological awareness skills and vocabulary size differs between Dutch children attending early-English education and Dutch children attending monolingual education. Thus, what this question does is that it evaluates whether the findings from sub-question 1 can be explained by vocabulary size (English, Dutch or combined vocabulary size).

Hence, as an effect of type of education on phonological awareness scores was expected for sub-question 1, this question has the aim to check whether there is a mediation effect of type of education via vocabulary size on phonological awareness. To investigate this, a mediation analysis is needed, following the steps by Baron & Kenny (1986). This allows me to check whether the effect of type of education on phonological awareness is simply very strong or that this effect is mediated via vocabulary size. This method is very suitable for deciding which one of the two options provided in the introduction of this proposal holds.

However, a mediation analysis can only be conducted if the hypothesised effect of sub-question 1 will be found. If this effect were not to be found, a mediation analysis cannot be conducted. Hence, if type of education would not yield a significant effect on phonological awareness in the first place, the mediation analysis would not be conducted, but would be replaced by regression analyses, as those can be conducted without a significant effect of type of education on phonological awareness.

In that case, six regression analyses would be conducted. For these analyses, three have Rhyming as a dependent variable and three have Synthesis as a dependent variable. The variables per regression analysis would be the following. For the first regression analysis, Rhyming would be the dependent variable and the independent variables would be Type of Education, Grade and English vocabulary size. The second regression analysis would take Rhyming as a dependent variable and Type of Education, Grade and Dutch vocabulary size as independent variables. The third regression analysis would also consider Rhyming as dependent variable and would take Type of Education, Grade and Combined Dutch and English vocabulary size as independent variables. The fourth, fifth and sixth regression analyses would all take Synthesis as a dependent variable. As independent variables, the fourth regression analysis would take Type of Education, Grade and English vocabulary size. The fifth regression analysis would take Type of Education, Grade and Dutch vocabulary size as independent variables. Finally, for the sixth regression analysis, Type of Education, Grade and Combined Dutch and English vocabulary size would be the independent variables. Additionally, these regression analyses would control for Verbal Short-Term Memory as a covariate.

In the results section below, the results for all sub-questions will be described. After the description of the results for sub-question 1 and 2, the choice can be made to either perform a mediation analysis for sub-question 3 or to perform the six regression analyses described. As mentioned, this choice depends on whether or not a significant effect of Type of Education on Rhyming and Synthesis would be found from the first sub-question.

3. Results

To test my hypotheses, the data were analysed using IBM SPSS Statistics 21.0 (IBM Corp., 2012). In this section, the results for each sub-question will be described separately, starting with sub-question 1, followed by sub-question 2 and finally sub-question 3.

One of the variables that was involved in the analyses in the following is Grade. Grade was taken as an age division instead of the absolute individual age of the participants, because taking absolute age as a division for grouping the participants into two groups for the comparison would mean that children in different grades in primary school could be grouped together, leading to groups which are very heterogeneous in terms of their education experience. Two children could have the same age but could be divided into two different groups because

of the month they are born in. Consequently, the one that is in the higher grade has attended school for longer plus is surrounded by older children, which is likely to cause that child to have a different level of phonological awareness than a child that has the same age but has less school experience and is surrounded by younger children. When taking Grade as a division, this variation can be ruled out and groups will be more homogeneous in terms of their phonological development.

3.1 Sub-question 1

Sub-question 1 addressed the question to what extent Dutch children in early-English education differ from Dutch children in monolingual schools in their phonological awareness. For sub-question 1, two ANCOVA's were performed. The assumptions for the analyses of covariance (among which also the assumptions for the analyses of variance for the next sub-question) were: the dependent variable should not differ significantly from a normal distribution, variances should be equal, the dependent variable should be at least of interval level, groups should be independent, homogeneity of regression lines, and the covariate and independent variable should be independent. Before conducting the statistical analyses, all assumptions were checked. All assumptions were met, except for the assumption of normality: the dependent variables did deviate significantly from a normal distribution. However, although the dependent variables Synthesis and Rhyming both differed significantly from a normal distribution, the assumption of normality was assumed after all, because this assumption is robust to violations when the assumption of homogeneity of variances is met (Field, 2009). This latter assumption was met and therefore we can conclude that the assumption of normality is met as well.

ANCOVA 1: Effects of Grade and Type of Education on Rhyming:

The first analysis of covariance addressed the effect of Grade and Type of Education on Rhyming ability. A significant main effect of Grade on Rhyming was found, in the sense that children in Grade 2 (M = 13.62, SD = .22) were significantly better at Rhyming than children in Grade 1 (M = 12.25, SD = .24), F (1, 146) = 16.84, $p < .001$, $\eta^2 = .103$). According to Cohen (1988, 1992) and Field (2009), this is a medium effect size.

Furthermore, there was a non-significant main effect of Type of Education on Rhyming ability, F (1, 146) = .15, p = .701, η^2 = .001. This meant that early-English education children (M = 12,87, SD = .23) did not differ significantly from regular education children (M = 13.00, SD = .24) with regard to their Rhyming scores.

There was no significant interaction effect between Type of Education and Grade on Rhyming ability, F (1, 146) = .14, p = .707, η^2 = .001. This indicates that children from both education types showed the same trend, i.e. both regular education children and early-English education children showed an increase in their Rhyming score in Grade 2 compared to Grade 1, as can be found in Figure 5, below. Children attending early-English education were found to be better at Rhyming in Grade 2 (M = 13.62, SD = .32) than in Grade 1 (M = 12.13, SD = .32). The same pattern was found in regular education attending children, in the sense that they were better at Rhyming ability in Grade 2 (M = 13.62, SD = .31) than in Grade 1 (M = 12.38, SD = .36) as well.

As for the covariate, a significant effect of Verbal Short Term Memory (word span) on Rhyming ability was found, F (1, 146) = 16.01, $p < .001$, $\eta^2 = .099$. This effect size is of medium strength (Cohen, 1988, 1992; Field, 2009).

ANCOVA 2: The effects of Grade and Type of Education on Synthesis:

The second analysis of covariance addressed the effect of Grade and Type of Education on Synthesis. Firstly, a significant main effect of Grade on Synthesis was found, in the direction that children in Grade 2 (M = 13.27, SD = .32) were significantly better at Synthesis than children in Grade 1 (M = 10.53, SD = .35), F (1, 146) = 33.48, $p < .001$, $\eta^2 = .187$. This is a large effect size (Cohen, 1988, 1992; Field, 2009).

Secondly, this analysis showed that there was a non-significant main effect of Type of Education on Synthesis scores, F (1, 146) = .68, $p = .409$, $\eta^2 = .005$, which means that early-English education children (M = 12.09, SD = .32) did not differ significantly from regular education children (M = 11.71, SD = .34) in their Synthesis scores.

In this analysis too, there was no significant interaction effect between Type of Education and Grade on Synthesis scores, F (1, 146) = .001, $p = .980$, $\eta^2 = .000$. This indicates that children from both education types showed the same trend, i.e. both regular education children and early-English education children showed an increase in their Synthesis score in Grade 2 compared to Grade 1. Children attending early-English education were found to be better at Synthesis in Grade 2 (M = 13.47, SD = .45) than in Grade 1 (M = 10.71, SD = .46). The same pattern was found in regular education attending children, in the sense that they were better at Rhyming ability in Grade 2 (M = 13.08, SD = .45) than in Grade 1 (M = 10.34, SD = .51) as well. This trend can be seen in Figure 6, as the lines for both groups are parallel in this figure too.

As for the covariate, the results revealed a significant effect of Verbal Short Term Memory (word span) on Synthesis, F (1, 146) = 16.06, $p < .001$, $\eta^2 = .099$. The effect size is of medium strength according to Cohen (1988, 1992) and Field (2009).

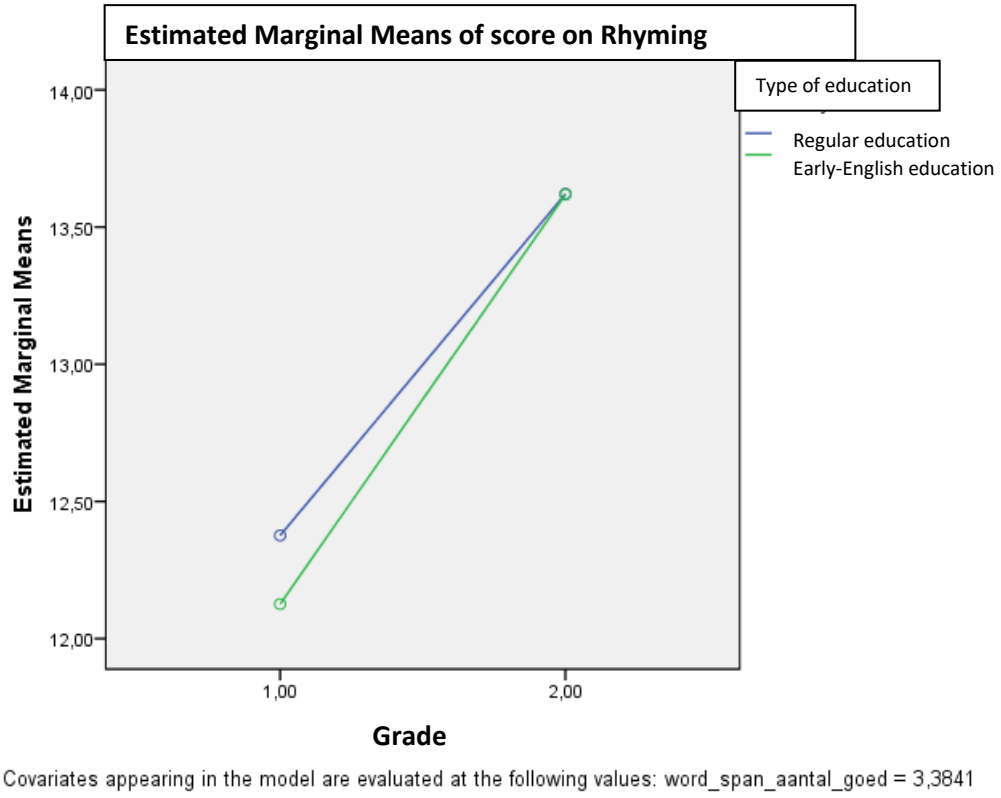

Figure 5. The Effects of Type of Education and Grade on Rhyming Ability.

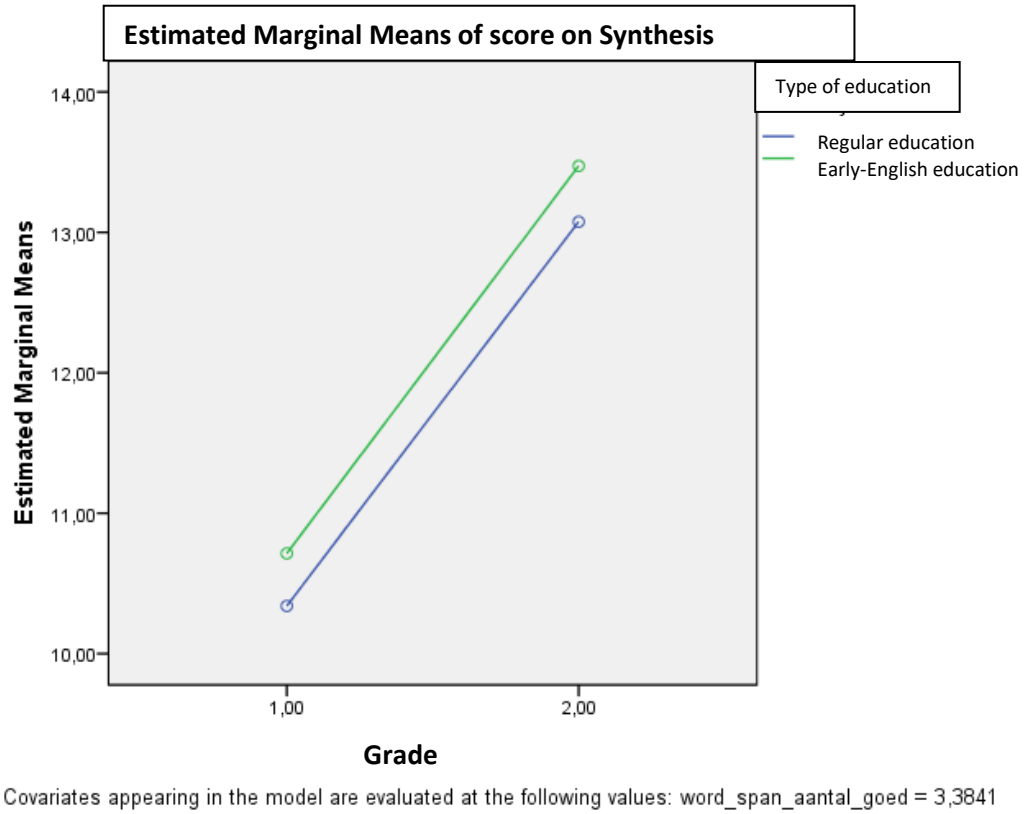

Figure 6. The Effects of Type of Education and Grade on Synthesis.

3.2 Sub-question 2

The second sub-question asks to what extent Dutch children in early-English education differ from Dutch children in monolingual schools in their vocabulary size in Dutch and in English and in their combined vocabulary size (Dutch and English taken together). For this, three ANOVA's were performed.

ANOVA 1: The effects of Grade and Type of Education on English Vocabulary Size

The first analysis of variance for sub-question 2 addressed the effect of Grade and Type of Education on English Vocabulary Size, of which the findings are plotted in Figure 7. There was a significant main effect of Grade on English Vocabulary Size, in the sense that children in Grade 2 (M = 26.94, SD = 1.24) had a significantly bigger English Vocabulary Size than children in Grade 1 (M = 20.29, SD = 1.34), F (1, 147) = 13.25, $p < .001$, $\eta^2 = .083$. According to the distribution made by Cohen (1988, 1992) and Field (2009), this effect is of medium strength.

In addition, there was a significant main effect of Type of Education on English Vocabulary Size, in the sense that children in early-English education (M = 26.43, SD = 1.27) possessed a bigger English Vocabulary Size than the children in regular education (M = 20.79, SD = 1.32), F (1, 147) = 9.51, $p < .05$, $\eta^2 = .061$. This is a medium effect size (Cohen, 1988, 1992; Field, 2009).

Furthermore, a non-significant interaction effect was found between Grade and Type of Education on English Vocabulary Size, F (1, 147) = 1.13, $p = .290$, $\eta^2 = .008$. This indicates that children from both education types showed the same trend, i.e. both regular education children and early-English education children showed an increase in their English Vocabulary Size in Grade 2 compared to Grade 1. Children attending early-English education were found to be have a bigger vocabulary size in Grade 2 (M = 30.73, SD = 1.77) than in Grade 1 (M = 22.13, SD = 1.81). The same pattern was found in regular education attending children, in the sense that they had a bigger vocabulary size in Grade 2 (M = 23.15, SD = 1.75) than in Grade 1 (M = 18.44, SD = 1.98) as well.

ANOVA 2: The effects of Grade and Type of Education on Dutch Vocabulary Size

The second analysis of variance for sub-question 2 addressed the effect of Grade and Type of Education on Dutch Vocabulary Size, of which the findings are plotted in Figure 8. Firstly, a significant main effect of Grade on Dutch Vocabulary Size was found, in the sense that children in Grade 2 (M = 86.24, SD = 1.18) had a significantly bigger Dutch Vocabulary Size than children in Grade 1 (M = 74.87, SD = 1.28), F (1, 147) = 42.64, $p < .001$, $\eta^2 = .225$. This effect size is very large (Cohen, 1988, 1992; Field, 2009).

Besides, in contrast to the findings on English Vocabulary Size, no significant main effect of Type of Education on Dutch Vocabulary Size was found, that is, children in early-English education (M = 80.75, SD = 1.21) did not differ significantly in their Dutch Vocabulary

Size from the children in regular education (M = 80.35, SD = 1.26), F (1, 147) = .053, p = .819, η^2 = .000.

Finally, the results again revealed a non-significant interaction effect between Grade and Type of Education on Dutch Vocabulary Size, F (1, 147) = .000, p = .989, η^2 = .000. This indicates that children from both education types showed the same trend, i.e. both regular education children and early-English education children showed an increase in their Dutch Vocabulary Size in Grade 2 compared to Grade 1. Children attending early-English education were found to be have a bigger vocabulary size in Grade 2 (M = 86.43, SD = 1.68) than in Grade 1 (M = 75.08, SD = 1.73). The same pattern was found in regular education attending children, in the sense that they had a bigger vocabulary size in Grade 2 (M = 86.05, SD = 1.66) than in Grade 1 (M = 74.66, SD = 1.88) as well. This trend is visualized in Figure 8 and can be interpreted from the parallel lines in this graph.

ANOVA 3: The effects of Grade and Type of Education on Dutch and English Combined Vocabulary Size

The last analysis of variance was performed to assess the effects of Grade and Type of Education on Dutch and English Combined Vocabulary Size. The results of this third ANOVA can be found in Figure 9. To combine the vocabulary size, the measures of Dutch and English PPVT (Dunn & Dunn, 2005; Dunn & Dunn, 2007) were summed. Because the Dutch and English PPVT consist of different stimulus words, it was not possible to take the scores together as a balance measure of the vocabulary sizes of both languages relative to each other. This is a problem that is being discussed in other studies as well. For instance, Vega & Fernandez (2011), in a study on the effects of bilingualism on intelligence and executive functions, tried to solve this by making up a balance measure of both languages' vocabulary size. This allowed them to divide the participants into two groups, one more balanced (and thus more bilingual) and one less-balanced (and thus less bilingual) group. In the current study, we cannot solve the problem in that way because of the different stimuli and the difference in the number of mistakes that participants could make (and thereby the difference in scoring). For this reason, the vocabulary sizes were summed instead of taking a balance measure. However, this is something to keep in mind during the interpretation of the results.

First, there was a significant main effect of Grade on combined vocabulary size, in the sense that children in Grade 2 (M = 112.95, SD = 1.94) had a bigger overall vocabulary size than the children in Grade 1 (M = 95.15, SD = 2.10), F (1, 147) = 38,86, p < .001, η^2 = .209. This effect size is very large (Cohen, 1988, 1992; Field, 2009).

Second, I found a significant main effect of Type of Education on combined overall vocabulary size, in the sense that children in early-English education (M = 107.18, SD = 1.98) outperformed the children in regular education (M = 100.93, SD = 2.06) in their overall Dutch and English Combined Vocabulary Size, F (1, 147) = 4.80, p < .05, η^2 = .032. This effect size is small (Cohen, 1988, 1992; Field, 2009).

Finally, a non-significant interaction effect between Type of Education and Grade was found on Dutch and English Combined Vocabulary Size, F (1, 147) = .561, p = .455, η^2 = .004. This indicates that children from both education types showed the same trend, i.e. both regular education children and early-English education children showed an increase in their Dutch and

English Combined Vocabulary Size in Grade 2 compared to Grade 1. Children attending early-English education were found to have a bigger vocabulary size in Grade 2 (*M* = 117.15, *SD* = 2.76) than in Grade 1 (*M* = 97.21, *SD* = 2.83). The same pattern was found in regular education attending children, in the sense that they had a bigger vocabulary size in Grade 2 (*M* = 108.76, *SD* = 2.73) than in Grade 1 (*M* = 93.09, *SD* = 3.09) as well. This trend is visualized in Figure 9 and can be interpreted from the parallel lines in this graph.

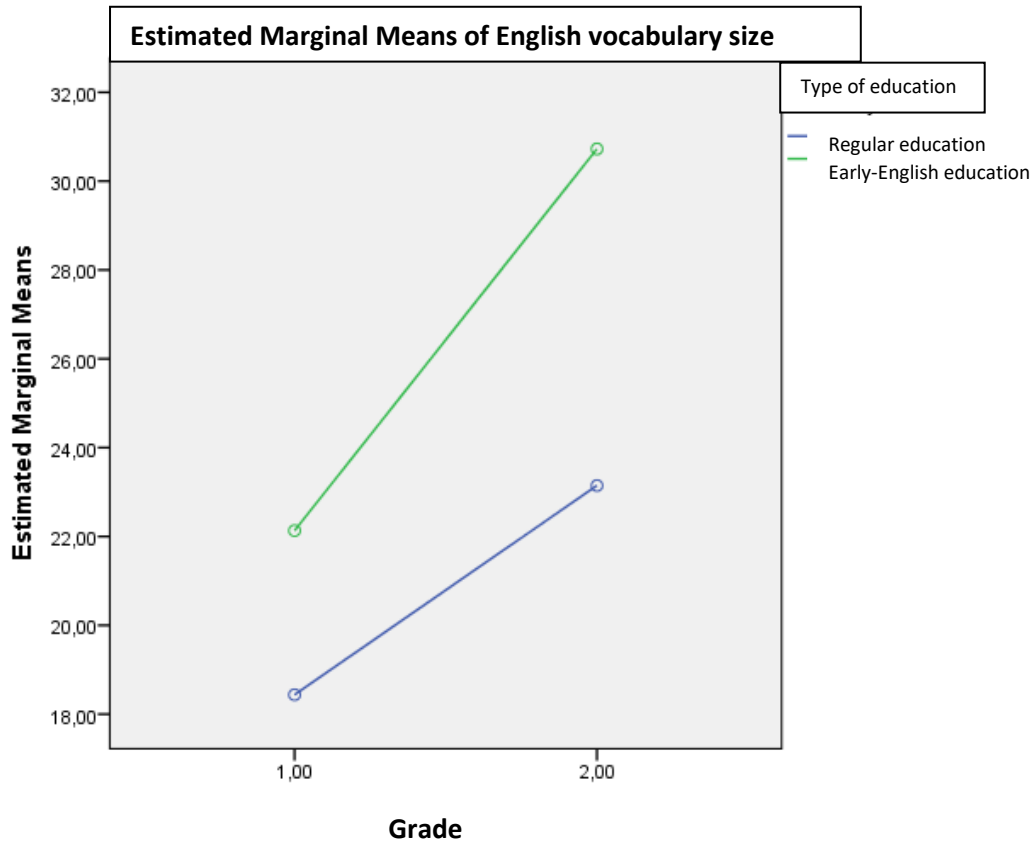

Figure 7. The Effects of Type of Education and Grade on English Vocabulary Size.

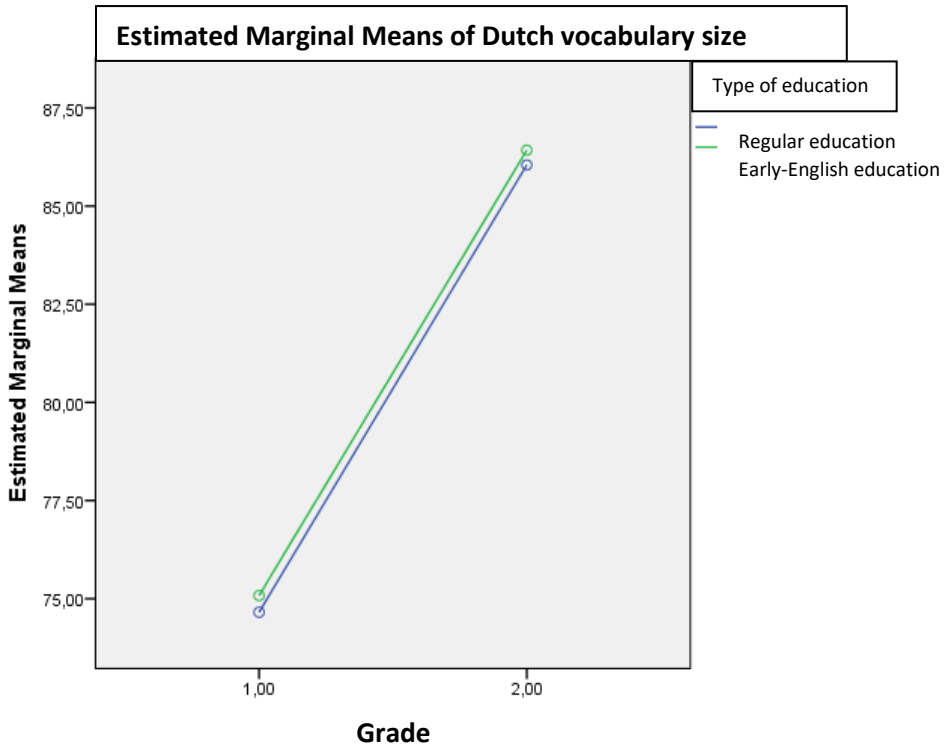

Figure 8. The Effects of Type of Education and Grade on Dutch Vocabulary Size.

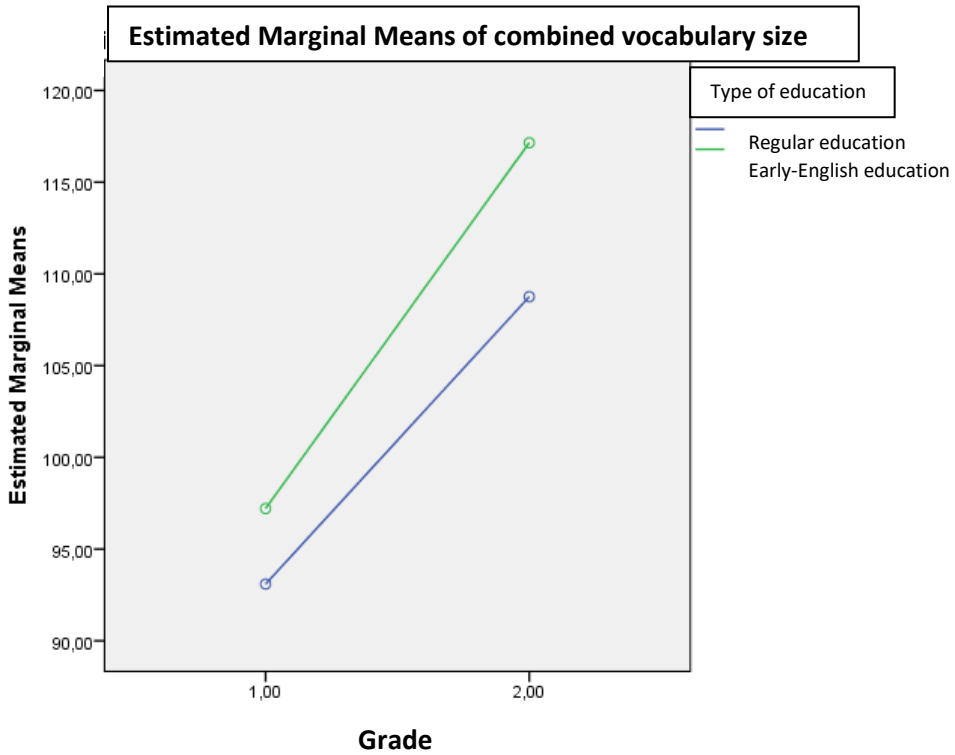

Figure 9. The Effects of Type of Education and Grade on Combined Vocabulary Size (Dutch and English).

3.3 Sub-question 3

From sub-question 1 and 2 it was found that children in Early-English education did not differ significantly from regular education children with regards to their phonological awareness skills. However, they did possess a significantly better vocabulary size in English and combined vocabulary size. The third sub-question addresses the question what the effects of vocabulary size on phonological awareness are. For this, six regression analyses were conducted to assess the effects of vocabulary size (English, Dutch and combined) on phonological awareness (Rhyming, Synthesis), while controlling for verbal short term memory. The effects of the different dependent variables were assessed in separate models. The assumptions for the regression analyses were the following: independence of observations, there should be a linear relationship between the dependent variable and the independent variables, no multicollinearity, errors should be normally distributed, and there should be no significant outliers. All assumptions were met.

To create an overview of the outcomes that followed from the six multiple linear regression analyses that were conducted for sub-question 3, the statistical values are reported in Table 3.

Table 3. *Statistical Outcomes of the Regression Analyses for the Third Sub-question.*

	Dependent variables					
	Rhyming			*Synthesis*		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Predictors						
Grade	*B:* 1.171* *SE B:* .339 *Beta:* .263	*B:* .834* *SE B:* .358 *Beta:* .187	*B:* .834* *SE B:* .353 *Beta:*.187	*B:* 2.514** *SE B:* .485 *Beta:* .375	*B:* 2.067** *SE B:* .514 *Beta:* .309	*B:* 2.095** *SE B:* .509 *Beta:* .313
Type of Education	*B:* -.303 *SE B:* .331 *Beta:* -.068	*B:* -.119 *SE B:* .315 *Beta:* -.027	*B:* -.308 *SE B:* .318 *Beta:* -.069	*B:* .173 *SE B:* .474 *Beta:* .026	*B:* .383 *SE B:* .452 *Beta:* .057	*B:* .155 *SE B:* .458 *Beta:* .023
English Vocabulary Size	*B:* .034* *SE B:* .015 *Beta:* .182			*B:* .039 *SE B:* .021 *Beta:* .138		
Dutch Vocabulary Size		*B:* .051* *SE B:* .015 *Beta:* .276			*B:* .065* *SE B:* .022 *Beta:* .231	
Dutch and English Combined Vocabulary Size			*B:* .033** *SE B:* .009 *Beta:* .293			*B:* .044* *SE B:* .013 *Beta:* .235
Verbal Short Term Memory	*B:* .444** *SE B:* .122 *Beta:* .271	*B:* .409* *SE B:* .120 *Beta:* .249	*B:* .395* *SE B:* .120 *Beta:* .241	*B:* .652** *SE B:* .175 *Beta:* .265	*B:* .603* *SE B:* .173 *Beta:* .245	*B:* .590* *SE B:* .173 *Beta:* .240
Additional values						
B (Constant)	9.021	6.208	7.049	4.918	1.356	3.528
F	12.045	13.981	14.420	16.805	18.707	18.773
Adj. R^2	.228	.257	.264	.296	.321	.322

**p<.05, **p<.001.*

Regression analysis 1: The effects of Grade, Type of Education and English Vocabulary Size on Rhyming

A multiple linear regression analysis was calculated to predict Rhyming ability based on Grade, Type of Education and English Vocabulary Size. The results are displayed in Table 3. The regression model was found to be significant, $F(4,146)=12.05$, $p<.001$, with an R^2 of .228. The latter value indicates that 22.8% of the Rhyming scores can be explained by the regression model.

As can be seen in Table 3, Rhyming score increased .03 points when English Vocabulary Size increased in score. For Grade 2 compared to Grade 1, Rhyming score increased 1.17, which means that children in Grade 2 had an average Rhyming score that was 1.17 points higher than children in Grade 1. In addition, the Rhyming score was on average .30 points lower for early-English education participants than for regular education participants. Finally, the regression analysis controlled for Verbal Short Term Memory. It was found that Rhyming score increased .44 points when Verbal Short Term Memory increased in score.

The first independent variable, English Vocabulary Size, was found to be a significant predictor of Rhyming ability, t (4,150) = 2.33, p = .021. Grade was found to be a significant predictor of Rhyming ability as well, t (4,150) = 3.46, p = .001. Furthermore, the results revealed that Verbal Short Term Memory was a significant predictor of Rhyming ability, t (4,150) = 3.64, $p<.001$. However, Type of Education did not appear to be a significant predictor of Rhyming ability, t (4,150) = -.92, p=.361.

Regression analysis 2: The effects of Grade, Type of Education and Dutch Vocabulary Size on Rhyming

A second multiple linear regression analysis was calculated to predict Rhyming ability based on Grade, Type of Education and Dutch Vocabulary Size. The regression model was found to be significant, $F(4,146)=13.98$, $p<.001$, with an R^2 of .257. The latter value indicates that 25.7% of the Rhyming scores can be explained by the regression model.

Rhyming score increased .05 points when Dutch Vocabulary Size increased in score. For Grade 2 compared to Grade 1, Rhyming score increased .83, which means that children in Grade 2 had an averagely .83 higher Rhyming score than children in Grade 1. Furthermore, the Rhyming score was .12 lower for early-English education participants than for regular education participants. Finally, Rhyming score increased .41 points when Verbal Short Term Memory increased in score.

The first independent variable, Dutch Vocabulary Size, was found to be a significant predictor of Rhyming ability, t (4,150) = 3.39, p=.001. Grade was found to be a significant predictor of Rhyming ability as well, t (4,150) = 2.33, p=.021. Furthermore, Verbal Short Term Memory was found to be a significant predictor of Rhyming ability, t (4,150) = 3.40, p=.001. However, Type of Education did not appear to be a significant predictor of Rhyming ability, t (4,150) = -.38, p=.706.

Regression analysis 3: The effects of Grade, Type of Education and Dutch and English Combined Vocabulary Size on Rhyming

The third multiple linear regression analysis with Rhyming as a dependent variable took the independent variables Grade, Type of Education, and Dutch and English Combined Vocabulary Size into the analysis. The regression model was found to be significant, $F(4,146)=14.42$, $p<.001$, with an R^2 of .264. The latter value indicates that 26.4% of the Rhyming scores can be explained by this regression model.

Rhyming score increased .03 when combined vocabulary size increased in score. When For Grade 2 compared to Grade 1, Rhyming score increased .83, which means that children in Grade 2 obtained on average a Rhyming score that was .83 points higher than children in Grade 1. As for Type of Education, Rhyming score was .31 lower for early-English education participants than for regular education participants. Finally, Rhyming score increased .40 points when Verbal Short Term Memory increased in score.

The first independent variable, English and Dutch combined vocabulary size, was found to be a significant predictor of Rhyming ability, t (4,150) = 3.59, $p<.001$. Grade was found to be a significant predictor of Rhyming ability as well, t (4,150) = 2.36, $p=.020$. Furthermore, Verbal Short Term Memory was found to be a significant predictor of Rhyming ability, t (4,150) = 3.28, $p=.001$. However, Type of Education did not appear to be a significant predictor of Rhyming ability, t (4,150) = -.97, $p=.334$.

Regression analysis 4: The effects of Grade, Type of Education and English Vocabulary Size on Synthesis

The fourth multiple linear regression analysis took Synthesis as the dependent variable and was calculated to predict Synthesis based on Grade, Type of Education and English Vocabulary Size. The regression model was significant, $F(4,146)=16.81$, $p<.001$, with an R^2 of .296. The latter value indicates that 29.6% of the Synthesis scores can be explained by the regression model.

Synthesis score increased .04 when English Vocabulary Size increased in score. For Grade 2 compared to Grade 1, Synthesis score increased 2.51, which means that children in Grade 2 had on average a 2.51 higher score on the Synthesis task than children in Grade 1. Furthermore, Synthesis score was .17 higher for early-English education participants than for regular education participants. Finally, Synthesis score increased .65 points when Verbal Short Term Memory increased in score.

Grade was found to be a significant predictor of Synthesis ability, t (4,150) = 5.18, $p<.001$. Verbal Short Term Memory was found to be a significant predictor of Synthesis score as well, t (4,150) = 3.74, $p<.001$. However, Type of Education did not appear to be a significant predictor of Synthesis scores, t (4,150) = .37, $p=.716$. Finally, English Vocabulary Size did not appear to be a significant predictor of Synthesis scores, t (4,150) = 1.87 $p=.065$.

Regression analysis 5: The effects of Grade, Type of Education and Dutch Vocabulary Size on Synthesis

This multiple linear regression analysis was calculated to predict Synthesis scores based on Grade, Type of Education and Dutch Vocabulary Size. The regression model was significant, $F(4,146)=18.71$, $p<.001$, with an R^2 of .321. The latter value indicates that 32.1% of the Synthesis scores can be explained by the regression model.

Synthesis score increased .07 when Dutch Vocabulary Size increased in score. For Grade 2 compared to Grade 1, Synthesis score increased 2.07, which means that children in Grade 2 averagely had a 2.07 higher score in the Synthesis task than children in Grade 1. Furthermore, Synthesis scores increased .60 points when Verbal Short Term scores increased. Finally, Synthesis score was .38 higher for early-English education participants than for regular education participants.

The first independent variable, Dutch Vocabulary Size, was found to be a significant predictor of Synthesis scores, t (4,150) = 2.97, p=.004. Grade was found to be a significant predictor of Synthesis ability as well, t (4,150) =4.02, $p<.001$. Verbal Short Term Memory was also found to be a significant predictor of Synthesis ability, t (4,150) = 3.49, p=.001. However, Type of Education did not appear to be a significant predictor of Synthesis scores, t (4,150) = .85, p=.398.

Regression analysis 6: The effects of Grade, Type of Education and Dutch and English Combined Vocabulary Size on Synthesis

The sixth and last multiple linear regression analysis was calculated to predict Synthesis scores based on Grade, Type of Education and Dutch and English Combined Vocabulary Size. The regression model was significant, $F(4,146)=18.77$, $p<.001$, with an R^2 of .322. The latter value indicates that 32.2% of the Synthesis scores can be explained by the regression model.

Synthesis score increased .04 when combined vocabulary size increased in score. For Grade 2 compared to Grade 1, Synthesis score increased 2.10, which means that children in Grade 2 had an averagely 2.10 higher score at the Synthesis task than children in Grade 1. Furthermore, when Verbal Short Term Memory increased, Synthesis scores increased by .59 points. Synthesis score was .16 higher for early-English education participants than for regular education participants.

The first independent variable, combined vocabulary size, was found to be a significant predictor of Synthesis scores, t (4,150) = 3.00, p=.003. Grade was found to be a significant predictor of Synthesis ability as well, t (4,150) = 4.12, $p<.001$. Furthermore, Verbal Short Term Memory was found to be a significant predictor of Synthesis scores, t (4,150) = 3.40, p=.003. However, Type of Education did not appear to be a significant predictor of Synthesis scores, t (4,150) = .34, p=.736.

4. Discussion

4.1 Summary of main findings

In the current study, the main question was to what extent vocabulary development relates to phonological awareness development in native Dutch children in early-English education compared to native Dutch children in regular education in grade 1 and 2 in primary school. For answering that main research question, three sub-questions were designed. The aim of the first sub-question was to examine to what extent Dutch children in early-English education differ from Dutch children in monolingual schools in their phonological awareness. The second sub-question was set up to investigate to what extent Dutch children in early-English education differ from Dutch children in monolingual schools in their vocabulary size in Dutch and in English and in combined Dutch and English vocabulary size. Finally, the last sub-question had the aim to examine whether the relationship between phonological awareness skills and vocabulary size differed between Dutch children attending early-English education and Dutch children attending monolingual education.

These questions were operationalised in the present study by conducting two phonological awareness tasks, i.e. a synthesis and a rhyming task. These were conducted among children in regular education primary schools, that offered English from grade 7 on, and among children in early-English education primary schools, who attended English education from grade 1 on. In addition, a vocabulary size task was conducted, in English and in Dutch. Additionally, a verbal short-term memory task was performed, to control for possible effects of memory on phonological awareness.

The first aim was to assess to what extent Dutch children in early-English education differed from Dutch children in monolingual schools in their phonological awareness. From this, no interaction effects were found between Grade and Type of Education on Synthesis and Rhyming scores. This means that children from early-English and control school schools did not differ from each other in their rhyming or synthesis performance, neither in grade 1 nor in grade 2. This is not in line with the hypothesis, because the hypothesis was that Dutch-speaking children in early-English education would initially (grade 1) outperform monolingual Dutch-speaking children in regular education in their phonological awareness skills, but this effect was expected to decrease over time (grade 2). This hypothesis was based on studies by Bruck and Genesee (1995), Chiappe et al. (2007) and Yelland et al. (1993). However, those studies did not focus on the comparison between early-English education and regular education children, but concerned immersion education children compared to regular education children. As there are no studies on the effect of early-English education on phonological awareness skills yet, the hypotheses were based on these studies, as immersion education is closer to early-English education than bilingualism is, in terms of weekly English language exposure (Persson, 2012). In other words, the expectation was that early-English children would differ significantly from regular education children in grade 1, but not in grade 2. If that would be the case, the present study should have found a significant interaction effect of Grade and Type of Education on Synthesis and Rhyming scores.

Since I do not find the expected pattern that was found in immersion education studies, it can be concluded that the patterns for phonological awareness development in immersion education children cannot be generalised to early-English education children. The main difference between immersion education and early-English education in the Netherlands is the

hours of exposure to the English language. Those previous studies (Bruck & Genesee, 1995; Chiappe et al., 2007; Yelland et al., 1993) thus did show that immersion education children outperformed regular education children in grade 1 but our study with early-English education children did not show that early-English education children outperformed regular education children in both grades. This could be due to the amount of exposure. More exposure may be needed to find an effect of learning English on phonological awareness. The results from the present study would thereby attribute to the transitional pattern that previous studies on bilingualism and the mentioned studies on immersion education constitute. This pattern shows a transition from being less bilingual to being more bilingual and having worse to better phonological awareness scores to worse phonological awareness scores, respectively. The transition that can be inferred from the present study in addition to previous studies is the following. A strong effect of bilingualism on phonological awareness became clear from multiple previous studies, in the direction that bilingual children had an advantage in phonological awareness in comparison to monolingual children (Bialystok et al., 2003; Chen et al., 2004; Campbell & Sais, 1995; Loizou & Stuart, 2003). With respect to immersion education, a beneficial effect for immersion education children compared to regular education children in terms of their phonological awareness skills has been found as well (Bruck & Genesee, 1995; Chiappe et al., 2007; Yelland et al., 1993). However, this effect was weaker than the beneficial effect of bilingualism, as in second grade the effect of immersion education disappeared, i.e. there was no significant difference between immersion education children and regular education children in phonological awareness skills in second grade anymore. In studies on bilingualism, this was not the case, since bilingual children had better phonological awareness skills than monolingual children in both grades (Bialystok et al., 2003).

In the present study, no significant effect of type of education (i.e. early-English education compared to regular education) was found. This means that there was no sign of any benefit of early-English education on phonological awareness skills. As described in the general introduction, the hours of exposure to an L2 for the participants in the studies on bilingualism were higher than the hours of exposure to an L2 for the participants in the studies on immersion education, which in turn also were higher than the hours of exposure to English in early-English education. The beneficial effects on phonological awareness also were strongest in the studies on bilingualism, followed by a weaker effect in the studies on immersion education, to be finished by the present study on early-English education that found no significant effect. This trend could imply that more exposure is needed to benefit from learning a second language in phonological awareness skills. Perhaps this benefit could thus come later in early-English children. Future studies, with groups that differ in amount or years of exposure, are required to provide more evidence for this trend and shed more light on this trend within the same language, as not all of these studies considered the same languages.

Another effect that was found was that children in regular education and children in early-English education both followed the trend that they were better at the rhyming and synthesis tasks in grade 2 than in grade 1. This effect of second graders outperforming first graders at phonological awareness tasks was found to be significant. Beforehand, it was expected that children in grade 2 would be better at phonological awareness than the children in grade 1. This expectation was thus confirmed by the present study and this is logical, because the children in second grade were older and had gone to school for longer than the first graders. In the Netherlands, guidelines for primary schools have been set up. Stichting Leerplanontwikkeling (SLO) and Expertisecentrum Nederlands, which are foundations that make school policies, designed these guidelines. These guidelines were designed to make sure that all primary schools are similar in their level of education. For grade 1 and 2, twelve goals

concerning language education were formulated (Greven & Letschert, 2006; SLO, 2006). One of these goals concerns phonological awareness and requires primary school teachers to include the following aspects of phonological awareness in first and second grade lessons: 1) subtracting words from a sentence, 2) subtracting the separate words from words that are composed of two words, 3) connecting sound chunks to words, 4) assigning words to different sound groups, 5) practising rhymes, 6) recognizing rhymes at the end of a word, and, finally, 7) applying rhyme. These requirements should be reached by pupils by the end of grade 2. Teachers should thus follow these guidelines in their lessons to meet these requirements as they are universal for all schools in the Netherlands. Therefore, children in grade 2 should have more experience with, and consequently are better at phonological awareness tasks than children in grade 1 (Greven & Letschert, 2006; SLO, 2006).

In this study, verbal short-term memory was included as a control variable in the analyses regarding the relation between type of education and phonological awareness, as short-term memory abilities have previously been found to be related to (at least some aspects of) phonological awareness (e.g. Oakhill & Kyle, 2000). The present study confirmed this, since a significant relationship between verbal short-term memory and both rhyming and synthesis scores was found. In the rhyming and synthesis tasks, children were asked to choose one of the three previously mentioned answer options. Children that have a good memory command are more likely to remember all options. Children that have a worse memory command may forget how the answer options were named and may assume that the picture option of the word 'bald', for instance, referred to the word 'head' (De Hoog et al., 2016). This could have caused them to provide the wrong answer at the tasks

In sum, the main findings from the first sub-question were that early-English education children and regular education children did not differ significantly in their phonological awareness skills. This was not in line with the hypothesis, as it was expected that early-English education children would outperform regular education children in their phonological awareness skills, at least in first grade. Furthermore, second graders were found to outperform first graders in the synthesis and rhyming tasks of phonological awareness. This could be due to the second graders' experience with phonological awareness tasks in class.

The second aim was to investigate to what extent Dutch children in early-English education differed from Dutch children in monolingual schools in their vocabulary size in Dutch and in English and in their combined Dutch and English vocabulary size. As for Dutch vocabulary size, no significant differences between early-English education children compared to regular education children were expected.

Indeed, in the analysis, no significant effect of early-English education on Dutch vocabulary size was found. This is in line with the hypothesis, that was based on previous research on early-English education in the Netherlands that did not find any negative effects of early-English education on participants' L1 Dutch proficiency (de Bot, 2014; Goorhuis-Brouwer & de Bot, 2005; Goorhuis-Brouwer & de Bot, 2010). As explained in section 1.9 (Hypotheses), these previous studies focused on overall proficiency and did not go into vocabulary size only. Nevertheless, their conclusions do say something about the impacts of early-English education on L1 Dutch, which causes a tendency to expect no negative effects on L1 vocabulary size either. Furthermore, studies examining the influence of immersion education on vocabulary size showed variable outcomes as studies on the effects of immersion education on the L1 vocabulary size yielded different results for different languages (Bialystok

et al., 2003). Since these studies yielded variable results for immersion education on L1 vocabulary size already and early-English children received even less exposure than the immersion education children in prior studies, there was no reason to expect a significant difference in L1 vocabulary size in early-English education compared to regular education.

For Dutch vocabulary size, children in second grade had a significantly larger Dutch vocabulary size than children in first grade. This is logical, since children are still developing their vocabulary size during their entire primary school career. First and second grade teachers also pay a lot of attention to vocabulary size in class. The guidelines for primary-school education that were discussed previously (Greven & Letschert, 2006; SLO, 2006) also apply here, as goal 12 highlights the aspects of vocabulary that children should be able to know, actively or passively, after grade 2. This indicates that teachers should actively stimulate the children's vocabulary size, which is probably why there is a significant difference in Dutch vocabulary size between grade 1 and 2. This difference applied to regular education children as well as for early-English education children. They thus showed the same trend of having a greater Dutch vocabulary size in grade 2 than in grade 1.

As for their English vocabulary size, the expectation was that the early-English children would outperform the children attending regular education, since the early-English children received English lessons at school whereas the children in regular education did not. The present study indeed found that early-English children had a significantly bigger English vocabulary size than the regular education children. This finding is also in line with previous studies, (e.g. Goorhuis-Brouwer & de Bot, 2010) that already found a positive effect of early-English education in the Netherlands on English proficiency. The present study thus confirms that early-English education has a positive effect on children's English vocabulary size, in line with the hypothesis that was posed beforehand. This can be accounted for by the fact that early-English education children received more English language exposure than regular education children. Unsworth et al. (2015), for instance, state that an effect of vocabulary size is only likely to occur when the in-class exposure is more than what out-of-school exposure could account for. If not, namely, regular education children would be on the same level of English vocabulary size as the children in early-English education. Besides this out-of-school exposure, there are multiple other factors that could also influence the development of English vocabulary size. The ELLiE project (Early Language Learning Evidence project), for instance, proved that the school, the teacher and individual differences/learner characteristics or attitude could also play a role in the children's English vocabulary size (Enever, 2011).

It was also found that children in grade 2 had a significantly bigger vocabulary size than children in grade 1, in general, so for both early-English children and regular education children. For the early-English education participants this is probably due to the fact that they received English lessons from grade 1 onwards, which is why their English vocabulary size only increased from that grade on, because of more lessons. As for the regular education participants, there was an increase in English vocabulary size as well. This is in line with the results found by Unsworth et al. (2015), who also found that the monolingual Dutch speaking children had an increase in their English vocabulary size, even though they did not receive English education. Unsworth et al. (2015) argue that Dutch and English have many cognates and that the existence of these cognates in Dutch may help the children to deduce the meaning of the English stimuli. Prior studies namely also found that cognate linguistic distance and receptive vocabulary size were related (Lindgren & Muñoz, 2013). Furthermore, children's vocabulary size grows with age (Fenson et al., 2007). Therefore, if the children's Dutch vocabulary size increases and this vocabulary has a lot of cognates with English, their English vocabulary size will consequently grow too. In addition to this reason, the increase in English vocabulary knowledge could also have been strengthened by different (environmental) factors.

The children could, for instance, have learnt more English words by children's television shows or because of occasional lessons in English at regular education schools (e.g. Enever, 2011; Linebarger & Walker, 2004). Linebarger and Walker (2004), for example, showed that certain children's television shows resulted in a greater English vocabulary size for young children. The ELLiE project found this result of undubbed television shows on English language learning too (Enever, 2011).

Finally, as for children's combined vocabulary size, i.e. their English and Dutch vocabulary size taken together, the hypothesis was that the early-English education children would possess a bigger combined vocabulary size than the children in regular education. The results revealed that early-English education children had a significantly bigger combined vocabulary size than regular education children. This confirmed the hypothesis, because early-English education children had more English exposure, which led to a bigger English vocabulary size. This English exposure did however not affect the first language, as previous studies also proved (de Bot, 2014; Goorhuis-Brouwer & de Bot, 2005; Goorhuis-Brouwer & de Bot, 2010). Therefore, the Dutch vocabulary size was not negatively influenced by the early-English education but stayed stable, whereas the English vocabulary size increased for early-English education children (this applied to regular education children too, but for early-English education children this increase was stronger). Hence, when the Dutch and English vocabulary size are summed, this automatically results in a bigger combined vocabulary size for early-English education children. However, the reasoning that L1 is stable and we are thus looking at L2 vocabulary only, is not entirely accurate. From the regression analyses, it became clear that L2 vocabulary size was not the best predictor of phonological awareness, as will be discussed further in the discussion of sub-question 3 below. When looking at combined vocabulary size, on the other hand, this turned out to be a better predictor of phonological awareness. Therefore, this indicates that there must be some differences in Dutch vocabulary size after all, although small, which are of importance. The L2 vocabulary size thus is not the only factor affecting phonological awareness skills.

In addition, concerning Dutch and English combined vocabulary size, second graders were found to have a bigger combined Dutch and English vocabulary size than first graders. This was true for early-English education children as well as for regular education children. This is obvious, because children are in a developing process in primary school and are constantly developing their vocabulary size during their entire primary school career, as mentioned before.

In sum, the main findings from the second sub-question are that early-English children were found to have a bigger vocabulary size in English and a bigger Dutch and English combined vocabulary size than regular education children. However, early-English education children and regular education children did not differ significantly with respect to their Dutch vocabulary size, which means that following early-English lessons did not have negative effects on Dutch vocabulary size. The English vocabulary did not grow at the expense of the Dutch vocabulary size. Finally, it was also found that children in grade 2 in general had a bigger vocabulary size in English, in Dutch and in Dutch and English combined vocabulary size than in grade 1.

The third aim was to examine whether there was an effect of vocabulary size on phonological awareness scores in the rhyming and synthesis tasks. Beforehand, the hypothesis was that only combined Dutch and English vocabulary size would be a significant predictor of phonological awareness.

However, the results prove otherwise. In contrast with the hypothesis that only combined Dutch and English vocabulary size would be a significant predictor of rhyming and synthesis scores, the separate vocabulary sizes as well as the combined vocabulary size were found to be significant predictors of phonological awareness. For Rhyming scores, English vocabulary size, Dutch vocabulary size and combined Dutch and English vocabulary size were all found to be significant predictors of Rhyming ability. As for Synthesis scores, on the other hand, Dutch vocabulary size and combined Dutch and English vocabulary size both were significant predictors, but English vocabulary size was not. The regression model for Dutch and English combined vocabulary size was found to account for the biggest percentage of the variances found, namely 26.4 percent for rhyming scores and 32.2 percent for synthesis scores. As a comparison, the regression model for Dutch vocabulary size accounted for 25.7 percent of the rhyming scores and 32.1 percent of the synthesis scores. The regression model for English vocabulary size only explained 22.8 percent of the variation in rhyming scores and 29.6 percent in the synthesis scores.

Even though the hypothesis was not met in the sense that English vocabulary size turned out to be a significant predictor of Rhyming scores, which was not predicted, this can be accounted for by the existing literature. Like mentioned before, prior studies investigated the relationship between vocabulary size and phonological awareness (e.g. Chiappe et al., 2007). However, these studies only considered the vocabulary size in the second language, which in our case would be English. These studies did not find a clear effect of this vocabulary size to be a significant predictor of phonological awareness. In the present study, English vocabulary size appeared to be a significant predictor of rhyming ability, whereas there was no significant effect when it came to synthesis scores. This confirms that there is an effect of English vocabulary size on phonological awareness, but that this effect does not affect the entire phonological awareness skills, as it only applied to one of the two phonological awareness tasks, which makes the effect not generalizable to phonological awareness in general. Still, this is evidence for at least some influence of English vocabulary size on phonological awareness scores. This is in line with Chiappe et al. (2007) and Bruck & Genesee (1995), who did not find a clear effect of one of the two language's vocabulary size on phonological awareness for immersion education either. Chiappe et al. (2007), for instance, found vocabulary size to be unrelated to phonological awareness as well as reading skills. Bruck and Genesee (1995) did not find a difference between immersion education children and regular education children in vocabulary size and did not find this vocabulary size to be related to phonological awareness scores either, just like Chiappe et al. (2007). However, all of these previous studies only took separate vocabulary sizes into their analyses. As for combined vocabulary size, the hypothesis was confirmed as well, since this combined vocabulary size was found to be the most significant predictor and to explain the biggest part of the variance of the phonological awareness skills, more than Dutch or English vocabulary size. The present study thus confirms the proposed idea to take vocabulary sizes together and implies that it may be more reliable to do so, to get a more representative impression of a participant's vocabulary size.

Furthermore, the regression analyses showed that Dutch vocabulary size was a significant predictor of phonological awareness skills. This had already been shown, and been accounted for, in sub-question 1. Secondly, grade has been found to be a significant predictor of phonological awareness as well, which also already had become clear from the first sub-question. Finally, as expected after the results of the first sub-questions, type of education (early-English education or regular education) was found to be a non-significant predictor of phonological awareness. This means that the different types of education cannot account for the variation that we find in phonological awareness scores in the rhyming and synthesis tasks. In the first sub-question, it was already discussed that both groups of children did not differ

significantly in their phonological awareness skills. Therefore, type of education seems to be a weak predictor of phonological awareness skills.

However, this could also be due to other processes that may play a role in phonological awareness scores, because not all of the variation found in the phonological awareness scores was explained by the variables. This is something that needs to be kept in mind.

In sum, the main finding from the analyses that were conducted for the third sub-question were that combined vocabulary size is the best predictor for phonological awareness scores, over English vocabulary size or Dutch vocabulary size. Henceforth, I argue that it is preferable to take combined vocabulary size into analysis when comparing monolingual children with early-English children, because this may allow for a more accurate measure of vocabulary size. The two languages could namely be used in different contexts, which is the case in early-English education as well (in school), which causes children to perhaps know some words in one context or language but not in another. To get a reliable view of the vocabulary size that includes all words from different contexts, the current study provides a first piece of evidence that it is best to take the two vocabulary sizes together.

4.2 Limitations of this study

One might argue that the found results could indicate that a possible effect of early-English education on phonological awareness might exist, which is mediated by vocabulary size. This could be argued because early-English education children had a greater vocabulary size than regular education children and a greater vocabulary size, in turn, led to better phonological awareness skills. However, this possibility should be treated carefully as other variables can also play a role. There are quite some factors that could not be kept stable in the present study. For instance, the amount of time that teachers spend on phonological awareness skills could differ between schools, even though they should follow the same guidelines (Greven & Letschert, 2006; SLO, 2006). Furthermore, because no effect of early-English education on phonological awareness skills was found in the first place, a mediation regression analysis could not be conducted. A mediation analysis could namely only be conducted to check if a found effect would be mediated by another variable (Baron & Kelly, 1986). Therefore, there is no hard evidence from a mediation analysis. This assumption of a possible mediation via vocabulary size should thus be treated with caution and more, and longitudinal, follow-up studies are needed to make more certain inferences on this pattern. If future studies would find an effect of early-English education on phonological awareness, for instance in the higher grades or with a bigger age range, a mediation analysis could be conducted. This would shed more light on the role of vocabulary size and could help in solving the contradiction proposed in the Introduction of the present study.

For future research, longitudinal research or cross-sectional research with a bigger age range is needed, as the participants that were tested for the present study only just started learning English, since they were first and second graders. Perhaps these grades of comparison were too close together and perhaps two years of education was a bit too early to find effects of early-English education already. In the future, it would be good to make a comparison to, for instance, grade 3 as well, to investigate the effects of early-English education when children had more years of education than in the present study. Especially, it would be interesting how phonological awareness skills would be developed further after grade 2, since children learn how to read from grade 3 onwards. Previous studies proved phonological awareness and literacy development to be related (e.g. Carroll et al., 2003; Mann & Liberman, 1984; Stahl & Murray,

1994; Wagner & Torgesen, 1987), which consequently would be an interesting developmental step to include. This should be investigated carefully, however, since there are more variable factors in older ages, like school-external hobbies that children could start with when they get older which can lead to very different exposure profiles per child.

Furthermore, early-English education is a type of education that is still developing in the Netherlands, but since the amount of early-English education schools in the Netherlands is increasing, comparisons with different ages are likely to become more convenient in the future. The schools that are currently offering early-English education will get more experienced in providing this type of education and are likely to have a better idea of what would be the best way to offer English lessons. As a result, early-English education could be improved in future studies compared to the current study and could yield different results with respect to phonological awareness scores. Moreover, a new form of early-English education is currently developing. This is a pilot that is called Tweetalig Primair Onderwijs (TPO), which means *Bilingual Primary Education*. Children within this form of education receive more second language exposure than in early-English education, namely 30 to 50 percent of the time instead of the 15 to 220 minutes that children in early-English education receive English lessons (Persson, 2012; van den Broek et al., 2014). Perhaps investigating children within this form of education (TPO) would yield different results regarding phonological awareness skills than the current study yielded for children in early-English education.

Another limitation of this study was the way the combined vocabulary size was composed. As mentioned before, the two vocabulary size scores from the Dutch PPVT (Dunn & Dunn, 2005) and the English PPVT (Dunn & Dunn, 2007) were summed to get a measure of an overall combined vocabulary size. All children, however, had a greater vocabulary size in Dutch than in English. Consequently, the combined vocabulary size score was built up from a large score of Dutch and a smaller score of English vocabulary size. Combined vocabulary size was found to be a significant predictor of phonological awareness scores. As Dutch vocabulary size had already been proven to be a significant predictor of phonological awareness scores, and combined vocabulary size largely consisted of this Dutch vocabulary size because all children had a bigger Dutch than English vocabulary size, Dutch vocabulary size could have caused the effect that was found for combined vocabulary size.

The results that were found for combined vocabulary size in the present study can thus be argued to be caused most by Dutch vocabulary size scores. This is a problem that recent studies are working on solving by calculating balance measures for combined vocabulary size (e.g. Vega & Fernandez, 2011). Vega & Fernandez (2011), for instance, work with gain scores. This means that they calculate how bilingual a participant is by calculating the words that a participant did not know in one language but did know in the other language to gain insight into their overall vocabulary size. For the current study, however, this was not possible because of the different stimuli in both PPVT tests and because the number of mistakes that participants were allowed to make differed between the two PPVTs. Because the stimuli in the Dutch and English PPVT were different, namely, it could not be measured whether a child would know a word in both language or only in one, as the stimulus word only existed in one of the languages. This problem of calculating a combined vocabulary size measure of the PPVT in different languages has already been reported thirty years ago, introduced by Hakuta and Diaz (1985) who wanted to add up their participants' Spanish and English vocabulary size, but encountered the problem of both PPVT's containing different stimuli as well. To get a balance measure of the combination of the two vocabulary sizes, Hakuta and Diaz (1985) conducted an additional

task (a story retelling task) in both languages. The balance measure of both vocabulary sizes that they then used was the correlation of this story retelling task with the English and Spanish PPVT scores. However, they argue that this measure did not completely accurately mirror the participants' overall vocabulary size. For future research, it would be important to keep this problem in mind when combining vocabulary sizes.

Another suggestion for follow-up studies, would be to acquire participants with a wider range in Dutch vocabulary size. That way, the Dutch vocabulary scores would not be as comparable as they were in the current study but would be likely to show more variation. In the current study, namely, the range of Dutch vocabulary size scores was from 53 to 104. However, the majority had a score between 70 and 100. A second suggestion would be to consider children that are more proficient in English than in Dutch as well. This would make the sample of participants more heterogeneous and would provide a more representative view of the actual effects of Dutch vocabulary size, English vocabulary size and combined vocabulary size. As for combined vocabulary size, it would solve the problem of one of the vocabulary sizes explaining most of the variation found.

4.3 Societal impact of the results

Previous studies were found to evoke a contradiction, as described in section 1.7. To repeat, the three effects that caused this contradiction were the following. Bilinguals are likely to possess a smaller vocabulary size, a smaller vocabulary size could hinder phonological awareness and, finally, bilingualism may facilitate phonological awareness. This could be seen in Bruck & Genesee (1995) and Chiappe et al. (2007), who combined the three factors vocabulary size, immersion education and phonological awareness in their analyses. In both studies, the immersion education children outperformed the regular education children and, although limited, a difference in vocabulary size was found. Although being bilingual thus could mean having a smaller vocabulary size and, in relation to that, having less developed phonological awareness skills, the opposite was found in several studies (Campbell & Sais, 1995; Chen et al., 2004; Chiang & Rvachew, 2007; Metsala, 1999), as bilingual and immersion education children outperformed monolingual children in their phonological awareness skills.

The present study had the aim to investigate these effects and to account for this contradiction by taking Dutch and English vocabulary size together in the analyses. However, the present study did not find this contradiction. In fact, the results of the present study show that early-English education children were not better at phonological awareness tasks than regular education children, in contrast to what was hypothesised. Nonetheless, the present study serves as a good base regarding methodological issues for future research. From the analyses, it became clear that it is important to consider overall vocabulary size rather than the separate vocabulary sizes when investigating phonological awareness. It would therefore be good to take overall vocabulary size into the analyses in follow-up studies as well, in order to rule out possible effects of different contexts or use of the two separate vocabularies in the future, too (Vega & Fernandez, 2011). Perhaps future studies would then be able to make inferences on the contradiction that was evoked by previous studies as well.

Furthermore, although it was expected that early-English education would have a beneficial effect on phonological awareness skills, no effect of early-English education was found. However, early-English education children did show to have a bigger English

vocabulary size than regular education children. In addition, Dutch vocabulary size was not affected negatively, but developed in the same way as the regular education children's Dutch vocabulary size.

From this, we can conclude that early-English education yielded positive effects on vocabulary size, as the children attending early-English education profited from it by having a significantly bigger English vocabulary size, which did not go at the expense of their Dutch vocabulary size. Previous studies have shown that this was a concern that lives among parents of early-English education children, i.e. that their children's Dutch proficiency level would be affected by learning English (Goorhuis-Brouwer & De Bot, 2005). The findings of the present study contradict this concern in a way by showing that there seem to be no negative effects of early-English education in terms of the children's Dutch vocabulary size. Nevertheless, we cannot pose that early-English education only leads to benefits. The present study namely only tested receptive vocabulary size. Moreover, what the effect is of early-English education on other aspects than vocabulary development, for instance other measures of language proficiency or the children's (cognitive) development, was not assessed in the present study.

5. Conclusion

The aim of the present study was to investigate what the effect of early-English education on phonological awareness was and how this related to vocabulary development. To investigate this, two tasks of phonological awareness were conducted (rhyming and synthesis) among 78 Dutch children in early-English education and 73 Dutch children in regular education. The main conclusion of the present study is that combined Dutch and English vocabulary size and Dutch vocabulary size were found to be very clear predictors of phonological awareness, whereas English vocabulary size only predicted a part of phonological awareness scores. Additionally, combined vocabulary size explained most of the variation in phonological awareness scores. I therefore argue that it is important to look at combined vocabulary size instead of separate vocabularies of the two languages.

Furthermore, the present study showed that children in early-English education and regular education did not differ from each other in the phonological awareness tasks. This was in contrast to the hypothesis, as early-English education children were expected to outperform regular education children. However, early-English education children did prove to have a bigger English vocabulary size than regular education children.

The present study contributes to previous studies on the effects of early-English education by proving that early-English education has a positive effect on English vocabulary size. In addition, early-English education did not negatively affect Dutch vocabulary size. Hence, these English vocabulary enhancement effects provide more arguments to keep providing early-English education in the Netherlands and not to worry about the influence on Dutch vocabulary development.

Most importantly, with the finding of combined vocabulary size explaining most of the variance in the phonological awareness scores, the present study showed that combined vocabulary size could be a more representative measure of vocabulary size than separate

vocabulary sizes. Therefore, the present study implies that combined vocabulary size should be included in studies on early-English education, as it will provide a better insight into participants' actual vocabulary size. This is an important implication that should be kept in mind in follow-up studies and which could provide a base for those future studies to expand upon.

References

Aarts, R. en Ronde, S. (2006). Tweetalig onderwijs met vervroegd Engels in het basisonderwijs. *Levende Talen*, 7, 1-13.

Anthony, J.L., Lonigan, C.J., Driscoll, K., Phillips, B.M., & Burgess, S.R. (2003). Phonological Sensitivity: A quasi-parallel progression of word structure units and cognitive operations. *Reading Research Quarterly*, 38, 470-487.

Anthony, J.L. & Francis, D.J. (2005). Development of Phonological Awareness. *American Psychological Society*, 14, 255-259.

Baarda, D.B., Goede, M.P.M. de & Dijkum, C.J. van (2003). *Basisboek Statistiek met SPSS.* Groningen/Houten, the Netherlands: Wolters-Noordhoff.

Baker, C. (2001). *Foundations of Bilingual Education and Bilingualism*. Clevedon: Multilingual Matters Ltd.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51, 1173-1182.

Bialystok, E., Craik, F.I.M. & Luk, G. (2008). Cognitive control and lexical access in younger and older bilinguals. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34, 859–873.

Bialystok, E., Majumder, S. & Martin, M. (2003). Developing phonological awareness: is there a bilingual advantage? *Applied Psycholinguistics*, 24, 27–44.

Bialystok, E., Luk, G., Peets, K.F. & Yang, S. (2010). Receptive vocabulary differences in monolingual and bilingual children. *Biling*, 13, 525–53.

Bot, K. de (2014). The effectiveness of early foreign language learning in the Netherlands. *Studies in Second Language Learning and Teaching*, 4, 409-418.

Broek, E. van den, Graaff, R. de, Unsworth, S. & Zee, V. van der (2014). Voorstudie Pilot Primair Tweetalig Onderwijs. Groningen, The Netherlands: GION.

Bruck, M. & Genesee, F. (1995). Phonological awareness in young second language learners. *Journal of Child Language*, 22, 307-324.

Campbell, R. & Sais, E. (1995). Accelerated metalinguistic (phonological) awareness in bilingual children. *British Journal of Developmental Psychology*, 13, 61-68.

Carroll, J. M., Snowling, M. J., Stevenson, J., & Hulme, C. (2003). The development of phonological awareness in preschool children. *Developmental psychology*, 39, 913.

Castles, A. & Coltheart, M. (2004). Is there a causal link from phonological awareness to success in learning to read? *Cognition*, 91, 77-111.

Chen, X., Anderson, R.C., Li, W., Hao, M., Wu, X. & Shu, H. (2004). Phonological Awareness in Bilingual and Monolingual Chinese Children. *Journal of Educational Psychology*, 96, 142-151.

Chiang, P. & Rvachew, S. (2007). English-French bilingual children's phonological awareness and vocabulary skills. *Canadian Journal of Applied Linguistics*, 10, 293-308.

Chiappe, P., Glaeser, I. & Ferko, D. (2007). Speech Perception, Vocabulary, and the Development of Reading Skills in English Among Korean- and English-Speaking Children. *Journal of Educational Psychology*, 99, 154-166.

Chien, C. N., Kao, L. H., & Wei, L. (2008). The role of phonological awareness development in young Chinese EFL learners. *Language Awareness*, 17, 271-288.

Cito (2013). Flyer Screeningsinstrument Beginnende Geletterdheid. Retrieved February 26, 2017, from Cito Web Site: http://www.cito.nl/onderwijs/primair%20onderwijs/alle_producten/beginnende_geletterdheid_screeningsinstrument

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.).* New York: Academic Press.

Cohen, J. (1992). Statistical power analysis. *Current directions in psychological science*, *1*, 98-101.

Cossu, G., Shankweiler, D., Liberman, I.Y., Katz, L., & Tola, G. (1988). Awareness of phonological segments and reading ability in Italian children. *Applied Psycholinguistics*, 9, 1–16.

Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*, 49, 222-251.

Deelder, E. & Maljers, A. (2007). Vroeg vreemdetalenonderwijs in Nederland en Europa: jong geleerd is oud gedaan. In K. Philipsen, E. Deelder & M. Bodde-Alderlieste (Red.). *Early English: a good start.* Den Haag: Eurpees Platform.

Demont, E., & Gombert, J.E. (1996). Phonological awareness as a predictor of recoding skills and syntactic awareness as a predictor of comprehension skills. *British Journal of Educational Psychology*, 66, 315–332.

Doyle, A., Champagne, M., & Segalowitz, N. (1978). *Some issues in the assessment of linguistic consequences of early bilingualism.* In: M. Paradis (Ed.), Aspects of bilingualism (pp. 13-21). Columbia, SC: Hornbeam Press.

Dunn, L.M., & Dunn, D.M. (1997). *PPVT-III: Peabody picture vocabulary test*. Circle Pines, MN: American Guidance Service.

Dunn, L.M., Dunn, D.M., & Schlichting, L. (2005). *Peabody picture vocabulary test-III-NL*. Amsterdam, The Netherlands: Pearson.

Dunn, L.M., Dunn, D.M., & Schlichting, L. (2005). *Handleiding Nederlandse versie Liesbeth Schlichting*. Lisse: Swets & Zeitlinger.

Dunn, L.M., & Dunn, D.M. (2007). *Peabody picture vocabulary test (PPVT-4) (Fourth Edition ed.)*. Minneapolis, USA: Pearson.

Dunn, L.M., & Dunn, D.M. (2007). *Peabody picture vocabulary test (PPVT-4), Fourth Edition, Manual*. Minneapolis, USA: Pearson, Wascana Limited Partnership.

Durgunoglu, A., & Oney, B. (1999). Cross-linguistic comparison of phonological awareness and word recognition. *Reading and Writing*, 11, 281–299.

Edwards, S. (1997). *The Reynell developmental language scales.* Windsor: NFER-Nelson.

Eldik, M.C.M.V. van, Schlichting, J.E.P.T., Lutje Spelberg, H.C., Meulen, B.F. van der & Meulen, S. van der (1995). *Reynell Test voor Taalbegrip. Handleiding*. Nijmegen: Berkhout.

Eldik, M. van (1998). *Meten van taalbegrip en taalproductie: Constructie, normering en validering van de Reynell test voor taalbegrip en de Schlichting test voor taalproductie.* Groningen: Doctoral disseration.

Enever, J. (2011). *ELLiE. Early language learning in Europe*. British Council.

EP-Nuffic (2016). Locaties vvto-scholen: inmiddels bieden ruim 1.150 basisscholen in Nederland vvto aan. Retrieved February 16, 2017, from EP-Nuffic Web site: https://www.epnuffic.nl/primair-onderwijs/talenonderwijs/vroeg-vreemdetalenonderwijs-vvto/locaties-vvto-scholen

Fenson, L., Marchman, V.A., Thal, D.J., Dale, P.S., Reznick, J.S. & Bates, E. (2007). *MacArthur–Bates Communicative Development Inventories: User's guide and technical manual.* Baltimore: Paul H. Brookes.

Field, A. (2009). *Discovering Statistics Using SPSS* (3rd ed.). London: SAGE Publications Ltd.

Gilzow, D.F. & Rhodes, N.C. (2000). Establishing High-Quality Foreign Language Programs in Elementary Schools. Perspectives on Policy and Practice. *Educational Resources Information Center*, 27, 3-14.

Goorhuis-Brouwer, S. & Schaerlaekens, A. (2000). *Handboek taalontwikkeling, taalpathologie en taaltherapie bij Nederlandssprekende kinderen.* Utrecht: Uitgeverij Tijdstroom.

Goorhuis-Brouwer, S. & Bot, K. de (2005). Heeft vroeg vreemde-talenonderwijs een negatief effect op de Nederlandse taalontwikkeling van kinderen? *Levende Talen,* 3, 3-7.

Goorhuis-Brouwer, S. & Bot, K. de (2010). Impact of early English language on L1 and L2 development in children in Dutch schools. *International Journal of Bilingualism,* 14, 289-302.

Greven, J. & Letschert, J. (2006). Kerndoelen Primair Onderwijs. Den Haag: *SLO, Ministerie van Onderwijs, Cultuur en Wetenschap.*

Grosjean, F. (2010). *Bilingual*. Harvard: Harvard University Press.

Guttman, L. (1945). A basis for analyzing test-retest reliability. *Psychometrika,* 10, 255-282.

Hakuta, K., & Diaz, R.M. (1985). The relationship between degree of bilingualism and cognitive ability: A critical discussion and some new longitudinal data. *Children's language*, 5, 319-344.

Herder, A., & De Bot, K. (2005). Vroeg vreemdetalenonderwijs in internationaal perspectief. *Groningen: Report for European Platform for Dutch Education.*

Hoog, B.E. de, Langereis, M.C., Weerdenburg, M. van, Keuning, J., Knoors, H., & Verhoeven, L. (2016). Auditory and verbal memory predictors of spoken language skills in children with cochlear implants. *Research in Developmental Disabilities*, 57, 112-124.

Houwer, A. de, Bornstein, M.H. & Putnick, D.L. (2013). A bilingual–monolingual comparison of young children's vocabulary size: Evidence from comprehension and production. *Applied Psycholinguistics,* 35, 1189-1211.

IBM Corp. (2012). IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.

Kuo, L. & Anderson, R.C. (2010). Beyond Cross-Language Transfer: Reconceptualizing the Impact of Early Bilingualism on Phonological Awareness. *Scientific Studies of Reading*, 14, 365-385.

Lindgren, E. & Muñoz, C. (2013). The influence of exposure, parents and linguistic distance on young European learners' foreign language comprehension. *International Journal of Multilingualism*, 10, 105–29

Linebarger, D. L., & Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *American behavioral scientist*, 48, 624-645.

Lo, Y.Y. & Murphy, V.A. (2010). Vocabulary knowledge and growth in immersion and regular language-learning programmes in Hong Kong. *Language and Education*, 24, 215-238.

Loizou, M. & Stuart, M. (2003). Phonological awareness in monolingual and bilingual English and Greek five-year-olds. *Journal of Research in Reading*, 26, 3-18.

Mann, V.A., & Liberman, I.Y. (1984). Phonological awareness and verbal short-term memory. *Journal of Learning Disabilities*, 17, 592–599.

Mann, V.A. (1986). Phonological awareness: The role of reading experience. *Cognition*, 24, 65-92.

Metsala, J.L. (1999). Young children's phonological awareness and nonword repetition as a function of vocabulary development. *Journal of Educational Psychology*, 91, 3-19.

Muñoz, C. (2006). *Age and the rate of foreign language learning*. Clevedon: Multilingual Matters.

Oakhill, J. & Kyle, F. (2000). The Relation between Phonological Awareness and Working Memory. *Journal of Experimental Child Psychology,* 75, 152-164.

Oller, D.K., Pearson, B.Z. & Cobo-Lewis, A.B. (2007). Profile effects in early bilingual language and literacy. *Applied Psycholinguistics*, 28, 191–230.

Pearson, B.Z., Ferncindez, S.C. & Oller, D.K. (1993). Lexical Development in Bilingual Infants and Toddlers: Comparison to Monolingual Norms. *Language Learning*, 43, pp. 93-120.

Persson, L. (2012). Engels voor kleuters. Een eerste verkenning naar de vormgeving van

vroeg vreemdetalenonderwijs in Nederland. *Levende Talen,* 13, 25-32.

Rolla, A., Carlo, M., August, D. & Snow, C. (2006). The role of language of instruction and vocabulary in the English phonological awareness of Spanish-English bilingual children. *Applied Linguistics,* 27, 229-246.

Romaine, S. (1999). *Bilingual language development.* The development of language, 251-275.

Rubin, H. & Turner, A. (1989). Linguistic awareness skills in grade one children in a French immersion setting. *Reading and Writing: An Interdisciplinary Journal*, 1, 73-86.

Schlichting, J. & Lutje Spelberg, H. (2003). A test for measuring syntactic development in young children. *Language Testing,* 20, 241-266.

SLO (2006). *Tussendoelen en leerlijnen. Tule.* Enschede, the Netherlands: SLO.

Stage, S.A., & Wagner, R.K. (1992). Development of young children's phonological and orthographic knowledge as revealed by their spellings. *Developmental Psychology*, 28, 287–296.

Stahl, S.A. & Murray, B.A. (1994). Defining phonological awareness and its relationship to early reading. *Journal of educational psychology*, 86, 221-234.

Swain, M. & Johnson, R.K. (1997). Immersion education: A category within bilingual education. In *Immersion education: International perspectives,* ed. R.K. Johnson & M. Swain, 1-16. New York: Cambridge University Press.

Thijs, A., Tuin, D. & Trimbos, B. (2011). *Engels in het basisonderwijs: verkenning van de stand van zaken.* Enschede: SLO.

Tingley, P.A., Dore, K.A., Lopez, A., Parsons, H., Campbell, E., Kay-Raining Bird, E. & Cleave, P. (2004). A Comparison of Phonological Awareness Skills in Early French Immersion and English Children. *Journal of Psycholinguistic Research,* 33, 263-287.

Treiman, R. (1987). Levels of Phonological Awareness. *American Educational Research Center,* 3-21.

Unsworth, S., Persson, L., Prins, T. & Bot, K. de (2015). An Investigation of Factors Affecting Early Foreign Language Learning in the Netherlands. *Applied Linguistics,* 36, 527-548.

Vagh, S.B., Pan, B.A. & Mancilla-Martinez, J. (2009). Measuring Growth in Bilingual and

Monolingual Children's English Productive Vocabulary Development: The Utility of Combining Parent and Teacher. *Child Development*, 80, 1545–1563.

Vega, C. & Fernandez, M. (2011). Errors on the WCST Correlate with Language Proficiency Scores in Spanish-English Bilingual Children. *Archives of Cinical Neuropsychology*, 26, 158-164.

Verhoeven, L. (2007). Early bilingualism, language transfer, and phonological awareness. *Applied Psycholinguistics*, 28, 425-439.

Vloedgraven, J., Keuning, J., & Verhoeven, L. (2011). Screeningsinstrument Beginnende Geletterdheid voor groep 2 en 3. *Cito B.V. Arnhem*, 1-44.

Wagner, R. K., & Torgesen, J. K. (1987). The nature of phonological processing and its causal role in the acquisition of reading skills. *Psychological bulletin*, 101, 192-212.

Westhoff, G.J. (1994). *Tweetalig onderwijs in de praktijk. Verslag van een studiereis*. Utrecht: Interfacultair Instituut voor Lerarenopleiding, Onderwijsontwikkeling en Studievaardigheden (IVLOS).

Woodcock, R.W. (1991). *Woodcock Language Proficiency Battery, Revised.* Itasca: Riverside Publishing.

Yelland, G. W., Pollard, J. & Mercuri, A. (1993). The metalinguistic benefits of limited contact with a second language. *Applied Psycholinguistics*, 14, 423-444.

Zink, I. & Lejaegere, M. (2002). *N-CDIs: Lijsten voor communicatieve ontwikkeling—Aanpassing en hernormering van de MacArthur CDIs van Fenson et al*. Leuven: Acco.