Learning Strategies to Aid L2 English Vocabulary Retention:

Classroom Learning Compared to E-Learning Using Words&Birds

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Abstract

The purpose of this pioneering exploratory study is to gain insight into the vocabulary learning strategies applied by young children (aged 9-12) in Dutch primary education involved in EarlyBird schools offering Early English, both a) in class and b) in the e-learning programme Words&Birds, aiming to improve vocabulary learning in e-learning and classroom setting, and to contribute to the literature on vocabulary learning strategies used by young children. The translation, compensation, contextual, cognitive and metacognitive strategies were considered. Qualitative data revealing the experience of young children in groups 5-8 were gathered using semi-structured interviews conducted in four EarlyBird schools with 62 participants in small groups. In the analysis, one single group was compared in two conditions (A: classroom learning, and B: Words&Birds). The results revealed differences between conditions in the strategies employed. In class, more use of the translation strategy was found, whereas in Words&Birds the compensation strategy played an important role. These findings may be related to e-learning programmes stimulating more autonomous learning, whereas strategies used in class imply more dependency on the teacher. However, the results showed that differences in strategies between schools, classes, and type of question occurred. A remarkable finding was that younger learners (in group 5) preferred the translation strategy over the contextual strategy, in contrast with the older learners. This finding was related to the *Levels of Processing* model. The findings can serve as a starting point for future in-depth and quantitative studies into this topic, including comparison of schools and groups.

Key words: Early English; Earlybird; Words&Birds; primary education; e-learning; vocabulary learning strategies; retention

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1. Introduction

The international orientation of the Netherlands calls children to gain gaining mastery in English. In addition, English is the language children come increasingly in contact with by e.g. the media and games. An early start with English in primary education is therefore considered as a means to using English in communication, and this will facilitate a better restart concerning English in secondary schools where English has become a core subject. The target is to include the language as an obligatory subject in primary education (Onderwijs2032, 2016; Corda, Philipsen & De Graaff, 2014). The two above-mentioned societal and educational developments in the Netherlands with regard to teaching and learning English as a second language are the starting point of this master's thesis.

Concerning English, vocabulary learning is important in mastering a second language (L2), as it is required for all other linguistic skills such as speaking, reading, listening and writing. As the goal of learning vocabulary is to remember words in order to use them in different contexts, vocabulary learning strategies are essential. Teachers can play an important role in teaching strategies to students (Yang & Wu, 2015).

Combining the importance of English vocabulary learning strategies, and the lack of studies into this subject concerning Early English and e-learning in the Netherlands, vocabulary learning strategies applied by young learners in primary school is the topic of investigation in this thesis. This pioneering study, having an exploratory approach, attempts to gain insight into the vocabulary strategies applied by young children (aged 8-12) both in class and in the e-learning programme Words&Birds and compare the strategies used in classrooms and Words&Birds, aiming to improve vocabulary learning in e-learning and classroom settings. Qualitative data revealing the experience of young children in groups 5-8 following the Early English programme will be gathered using a semi-structured interview. The findings are expected to be a starting point for future in-depth and quantitative studies.

The structure of this study is as follows. Chapter 1 provides an introduction, followed by a theoretical framework in chapter 2. In Chapter 3 the research questions are covered and chapter 4 describes the methodology. Next, chapter 5 provides an overview of the results and analysis, followed by chapter 6 giving a conclusion. Chapter 7 contains the discussion, followed by the references (chapter 8) and the appendices (chapter 9).

The goal of the rest of this chapter is to first provide an overview of the developments concerning the subject English in primary schools and the organisation behind it in section 1.1. The role of e-learning and learning English vocabulary is covered in section 1.2, including a description of the game Words&Birds for practising English that is taken into account in this study. This information is relevant in getting insight into how learning English takes place in EarlyBird schools and Words&Birds.

1.1 English in Dutch primary education

This section covers the developments in English in primary education from group 7 (1.1.1), moves to English from the start of primary school, named Early English (1.1.2), and then describes how the organisation EarlyBird plays an important role in the growth of Early English (1.1.3).

1.1.1. Eibo

In this globalising world the call for internationalisation enhances the need for mastering English as a means for communication (i.e., a *lingua franca)* in the world. Before 1981, in the Netherlands, English was taught as a subject only in secondary education. To promote the knowledge of English, the view that children in primary education should already be engaged in English lessons emerged. In order to meet the goal of knowing English at a young age, English as a subject was introduced in primary education (i.e., Eibo) in 1981. It became an obligatory subject 5 years later, with the Netherlands having a pioneering position in

introducing Eibo (Groot & Deelder, 2014). Fram that point on, English was offered in grade 7 and 8 with children exposed to English for half an hour up to 45 minutes a week in the school context.

1.1.2. Early English

In 2002 the need to learn at least one language besides the native language was put forward by several countries in the European Union (Groot & Deelder, 2014). This has led to the introduction of English as a subject from the start of primary school (grade 1) up to grade 8 (from now on referred to as *Early English)* in 2003. The number of schools with Early English has increasingly grown since then (Corda, Philipsen & De Graaff, 2014, p. 14-15). This growth resulted in a pilot programme on bilingual primary education (TPO) consisting of 20 primary schools in 2014, offering 30-50 percent of the lessons in English to increase the exposure to the language by making English the language of use (Groot & Deelder, 2014).

Offering Early English is rooted in the linguistic notion of the critical period (CP), that young L2 learners have an advantage over older learners in the degree to which the L2 will be mastered in a native-like way, although there is debate about the length, starting and ending age of the CP (Lenneberg, 1967; Newport, Bavelier & Neville, 2001). Yet, acquiring languages from birth occurs largely implicitly (i.e., without instruction), whereas learning languages in school situation occurs more by explicit instruction taking only a few hours of exposure per week (Krikhaar, 2014), which causes differences in amount and type of exposure compared to children learning the L2 in natural context surrounded by native speakers (Muñoz, 2008). Although these differences exist, the approach of Early English is a natural and implicit way of teaching languages to children in primary school.

1.1.3. EarlyBird

The organisation playing a key role in introducing Early English and TPO is *EarlyBird*, a national centre of expertise for Early English in primary education for children from 2 to 12

years old founded in 2003 and situated in Rotterdam. The goal of EarlyBird is more, better and earlier English, from which follows that the organisation can be considered as one of the frontrunners of Early English and has the intention to keep this position in the market. This goal is achieved by investing in the development of knowledge skills and products (Hoogendoorn, 2016).

The organisation has a network of 300 schools in the Netherland and offers several products and services to schools to assist with the implementation and development of Early English in pre-school, primary school and in early secondary school. Moreover, EarlyBird is involved in independent research and in the design of programmes to promote learning English. Furthermore, EarlyBird is co-developer of digital curricula and programmes for school television and has been involved in research studying the use of mobile phones by young learners of English.

EarlyBird's methodology in primary education consists of four principles (Hoogendoorn, 2016, p.2):

- "It takes into account the sensitive periods in human brain development;
- it is flexible;
- it is an evidence-based programme;
- Early English programmes in Dutch primary schools are not extensive as the pupils follow English lessons for only 60-90 minutes a week".

EarlyBird collaborates with other organisations involved in national development, such as Nuffic. Besides, the organisation is a member of the national platform of Early English and the Kenniskring English (Knowledge network for English) of primary teacher training schools, works together with researchers, regional partners and with developers of teaching methods and games (Hoogendoorn, 2016).

The organisation uses a didactic model based on communicative language acquisition with the approach that language learning should happen in a natural way as a means of communication instead of only learning grammatical structures (Krashen & Terrell, 1983; SLO, 2015). To implement this model in English teaching, language learners should first receive sufficient language input, which they need to process and produce (Moonen, 2014). EarlyBird uses this model in schools offering Early English by utilising a gradual structure with the focus on the skills listening, understanding and speaking in the lower classes of primary school (grade 1-4), followed by writing and listening skills in the higher classes (grade 5-8) (Hoogendoorn & Philipsen, 2013).

1.2 E-learning and English

The second development is the upcoming use of Information and Communication Technology (ICT) specifically used for educational purposes, called *e-learning* (Rubens, 2013). One way of applying e-learning is to use it as a means of *personalised* or *adaptive* learning, which implies that students learn at their own level, that educational content is adapted to their individual learning styles and that they learn at their own tempo (SLO, 2015, p. 40; Winkel, 2014, p. 239; Sebba, Brown, Steward, Galton & James, 2007).

To put this within the framework of learning languages, e-learning can be used as a tool to teach, learn, practise and assess languages; simultaneously providing learners with authentic native speaker input teachers cannot always offer (Oskam, 2013, p. 226). With regard to e-learning and vocabulary learning, substantial research has been conducted on learning English vocabulary strategies (Hulstijn, 2001; Mayer, 2003; Ybarra & Green, 2003; Yang & Wu, 2015). However, no studies are available taking into account vocabulary learning strategies in Early English programmes, or comparing strategies used in classroom learning with e-learning. In addition, another research gap exists as no research has been

conducted yet into the experience of L2 learners using the e-learning programme Words&Birds and their linguistic skills, or vocabulary learning specifically.

EarlyBird plays a role children's learning of English by means of e-learning, with the most recent addition being the development of the online platform *Words&Birds* created in collaboration with *Oefenweb*, allowing students aged 8-14 years to practise English both in class and at home. *Words&Birds* can be used independently from other teaching methods and is adaptive, which implies that children can practise at their own level. As speaking is the focus in classes of EarlyBird schools in line with the communicative approach of language learning, *Words&Birds* is designed to be used in addition to the English lessons, with the focus on spelling, vocabulary and writing skills.

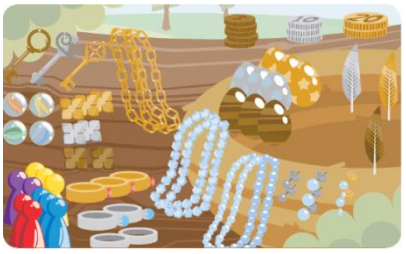
1.2.1. Words&Birds

Words&Birds (henceforth, W&B) is an online English method-independent programme including eight games to learn English to be used starting from the middle classes in primary education to the first and second grade in secondary education for second language learners of English. The 20,000 exercises are related to CEFR levels A1-B1. Children learn mainly vocabulary, spelling and grammar, using their listening (audio is provided for some games), writing and reading skills. Future plans consist of implementing more audio to provide players with native speaker input. W&B can be digitally accessed at school and at home on the computer or tablet, giving more practise opportunities compared to only receiving traditional instruction in class.

W&B is adaptive in adjusting to the student's level after each item based on the item response theory (IRT), providing an easier item after an incorrect answer is given, and a more difficult item after the item was answered incorrectly. This means that the student will always practise on his/her own level, and each student will answer at least 75 percent of the questions correct as a means of motivation, as chance of 50 percent correctness was found to deter users

from these kinds of games (Klinkenberg, Straatemeier, & Maas, 2011). The learner can choose his/her own difficulty of the items: easy, normal and difficult. Learners do not need to complete an assessment before starting with W&B, and no diagnostic tests are required for the learners. This ensures that the learner does not feel the pressure to make tests.

The gaming component includes an environment in which the learner needs to keep



birds flying by practising often, and players receive rewards to be used to cheer up their trophy shelf in the form of a bird's nest (see picture on the left). Each skill is represented by the logo of a specific bird, and the progress is visible to the learner through the height on which the birds fly and the number of birds visible. There is a need to keep playing, as the birds will be eaten by a cat when the student does not keep practising. The feature 'holiday stop' is included to ensure that children do not lose points when they celebrate holidays and spend less or no time on W&B.

The learner earns coins per game that is played. The number of coins depends on the answer speed and correctness of the answer. The scoring rule prevents the player from guessing items, as the coins that are left after a quick, incorrect answer will not be given to the player (Oefenweb, 2017c). For each item, a time limit of 20 seconds is set, as learner's response time to each question was shown to give a good indication of the learner's level (Klinkenberg, Straatemeijer, & Maas, 2011). The information concerning guessing is relevant for the present study as students are asked whether they guess answers in W&B as a strategy.

Detailed feedback is given to teachers and students in the dashboard, providing insight into difficult (nightmare) and easy (dream) exercises of each student per game and making it possible to compare students. In addition, the teacher can open and close certain games for each student as some games are better suited for more advanced learners. Moreover, the teacher receives an indication of the level of each learner compared to the average level that

should be achieved in grade 5 and grade 8. The language of instruction and feedback is English, although a planned future development is to provide these in Dutch to ensure the children understand their tasks and mistakes.

Considering the few open questions, learners need to type a word, and the closed questions are mainly multiple-choice questions (assessing passive knowledge). Passive knowledge is mainly assessed in W&B (Oefenweb, 2017a; 2017b).

Next, a description of the games is given (Oefenweb, 2017b).

In *Flashy*, students practise spelling words. The word is shown on the screen shortly after which the learner needs to remember and write the word down.

The game *Ducktator* asks the learner to spell words by hearing a sentence, then listening to one word from the sentence being repeated. Next, the student is asked to write down the repeated word. In this game the words are provided in context.

In the next game, *Chooser*, spelling is practised as well. Six words are shown, from which five words are spelled incorrectly. The learner has to click on the correctly spelled word.

In *Shaper* the learner need to provide the correct word form, training the knowledge of plurals, pronouns and the degrees of comparison. An example of a question addressing plurals is: ‘One bird. Two …’, in which the complete word ‘birds’ should be given.

WordoAudio is included to learn vocabulary. The player listens to an English word that is also provided on the screen, which implies that both visual and audio context is offered to increase retention. Next, the correct Dutch meaning is to be chosen from six answer options.

In *Puzzle* the player sees the letters of a word that have been shuffled. The learners have to put the letters in the correct order. On the screen, a word is provided that is

connected to the shuffled word. For example, the screen shows the word ‘feelings’, and the letters of the word ‘bad’ have to be put in the correct order. Again, practising spelling is placed in context, which is important to help students remember words. In Puzzle, words are offered in themes such as ‘fruit and vegetables’ or ‘sports’ along with a picture of the theme.

In *Verby* all aspects of the spelling of verbs are covered. The learner is offered a complete sentence containing a gap and the infinitive of the verb that is to be filled in correctly. The player can choose the correct verb form from 3 answer options.

Finally, in *Twinny* students learn set word combinations and expressions. They need to choose the correct word from several answer options that fits in the sentence already written on the screen.

For the purposes of this study, only the games *Ducktator*, *WordoAudio*, *Puzzle* and *Twinny* were examined, as these games target vocabulary learning and contextual learning.

2. Theoretical framework

Several fields of inquiry are relevant for the research topic. This chapter provides an overview of the scientific literature on English vocabulary learning. First, learning L2 vocabulary by young learners by explicit instruction is taken into account, which is the same for the participants in the present study. Very few studies dealt with Early English in the Netherlands. Haan (2014) investigated the results of 10 years of EarlyBird English, but did not take into account vocabulary learning. Brink (2015), however, studied vocabulary acquisition of L1 Dutch children in grade 8, finding better vocabulary knowledge in the early starters (EarlyBird schools) compared to the late starters (in Eibo schools). In addition, Sandberg, Maris and Hoogendoorn (2014) investigated English vocabulary learning using a mobile phone compared to classroom learning, which is the most relevant study concerning the present study.

Second, the role of memory in learning vocabulary in formal contexts is discussed, as the target of vocabulary learning is retention in long-term memory. Vocabulary learning strategies are examined because these are essential to aid remembering words.

Third, vocabulary learning by means of e-learning programmes is considered to show how online environments aid vocabulary learning. For the current study it is relevant to investigate whether and how vocabulary learning is accomplished in Words&Birds.

Fourth, one study comparing learning vocabulary in classroom versus e-learning condition is reviewed, because this approach is also used in the present study comparing vocabulary learning by the same groups in two conditions (i.e., traditional classroom instruction and in Words&Birds).

Paragraph 2.1 deals with learning L2 vocabulary by young learners, followed by a section on the role of memory in learning vocabulary connected with vocabulary learning strategies (2.2), vocabulary learning in online programmes (2.3) and a combination of word learning in both e-learning and classroom situations (2.4). In section 2.5 the scientific and practical relevance of the study is discussed.

2.1 Learning L2 vocabulary by young learners

This section covers findings in the literature regarding learning second language (L2) English vocabulary by young learners, not necessarily having Dutch as their native language (L1) as not much research has been conducted into L1 Dutch children learning L2 English vocabulary. Young learners are defined as learning an L2 in primary school aged between 4 and 12 years, as this is the target group of Early English.

The distinction between *explicit* (or *intentional*) and *implicit* (or *incidental*) learning is relevant here, related to acquisition of the (L1) and L2. Whereas learning vocabulary in the first language takes place implicitly by e.g. listening and reading, learning L2 vocabulary

often occurs explicitly in classroom situations when students receive instructions in lexical learning. Both types of learning contribute to the lexical knowledge of second language learners (Hulstijn, 2001). In addition, communicating in an L2 requires passive and active vocabulary knowledge. Hulstijn (2001) points at the necessity of assigning meaning to written or spoken words (i.e. passive knowledge), and to use a word actively in writing or speaking.

2.2 Vocabulary retention and learning strategies

Learning a word, both in L1 and L2 involves various components: processing auditory and visual input, producing spoken and written output, and knowing the syntactic and semantic relations between words (Ellis, 1995, p. 3), making it a complex task. Vocabulary needs to be retained in the mental lexicon or long-term memory before it can be recalled and produced in meaningful sentences. *Retention* is a memory storage process, which does not refer to vocabulary intake in class. Atkinson and Shiffrin (1968) describe this process as having different stages: after a word comes in and attention is paid to this by the learner, a transfer to short-term memory takes place. Repetition of this information causes a word to be transmitted to long-term memory, whereas in case of a lack of rehearsal the word is removed from short-term memory and lost (Hummel, 2014).

Connected to short and long-term memory, Craik and Lockhart (1972) developed a *Levels of Processing* model, stating that memory traces are made in the brain in learning e.g. a new word. A strong trace implies that words are stored in long-term memory. Craik and Lockhart identify three levels of information processing, namely a 1) *sensory* level, 2) *pattern recognition* and 3) *semantic enrichment* (as cited in Ellis, 1995, p. 9). The three processing levels can also be considered as different levels of analysis. Sensory information involves for example visual characteristics of a word, such as spelling. Pattern recognition is for example identifying the syntactic characteristics of a word. Semantic enrichment is relating a new

word to old information stored in long-term memory (Ellis, 1995). A word that moves from the first and second level to the third level ensures that a strong memory trace is made. Ellis (1995) distinguishes between 'deep' and 'shallow' processing in vocabulary learning, with the deeper the processing level, the stronger the traces. In the case of deep processing, lexical items are learned while 'semantic associations' or semantically connected concepts are activated in the brain, leading to vocabulary retention in long-term memory. Shallow processing, however, does not facilitate making connections with other words, but sticks to a sensory level of processing (Ellis, 1995). For instance, merely regarding the spelling of a newly learned word involves a shallow processing level, as it treats the word as a single concept without relating it other words already known.

Connecting word retention to vocabulary learning strategies, different strategies operate on different processing levels, with the goal of employing them to store words in long-term memory to recall them and use these in other contexts.

Concerning teaching L2 vocabulary to students at university, Ahmadvand and Nejadansari (2014) investigated whether *focus on form* beside *focus on meaning* had a beneficial effect on the consolidation of vocabulary (p. 116). Focus on form included pronunciation, spelling, irregular grammatical patterns and collocations, and focus on meaning is defined as receiving definitions, synonyms and antonyms (Ahmadvand & Nejadansari, 2014, p. 118). The experimental group received instruction in both form and meaning, whereas the control group was taught only meaning. The results showed that a focus on form in addition to a focus on meaning facilitated vocabulary retention. This study indicates that both focus on form and meaning should take place in L2 vocabulary instruction, which is relevant for the present study in investigating if and how this is revealed in classroom learning and W&B.

In contrast to older learners of an L2 starting to learn their L2 in the secondary school context, young learners have not developed the general cognitive abilities that can aid vocabulary learning (Li, 2009). Hulstijn (2001) writes that stimulating the older learners to be exposed to the L2 in listening and reading activities is insufficient to learn the second language, because in L2 speech or texts, L2 learners are likely to come across unknown words. Efficient vocabulary learning strategies can aid learning and remembering words, leading to more autonomy for the L2 learner (Prince, 1996; Rasek & Ranjbary, 2003). L2 learners might not come up with learning strategies themselves, so attention needs be paid to these. Hulstijn (2001) points out that vocabulary retention of new words is facilitated by taking into account the characteristics of the word and connections between words.

Of the several different kinds of strategies and classifications described and adapted in the literature, the classification of Schmitt (1997, as cited in Yang & Wu, 2015) identifies two types of strategies: discovery and consolidation (table 1). Discovery holds that the learner tries to find out the meaning of a word whereas consolidation involves active strategies the learner can use to remember the meaning of word (Segler et al., 2002). In the present study the notions *discovery* and *consolidation* are both considered as containing vocabulary learning strategies targeting retention (i.e., having a word retained in long-term memory). However, the terms discovery and consolidation are employed to point at the different processing levels, with consolidation strategies including a deeper processing level, making it more likely to retain vocabulary by learners.

Table 1
Classification of vocabulary learning strategies

Discovery	Consolidation
Translation (use dictionary, ask teacher, peers)	Contextual (verbal/non-verbal) Verbal: audio, visual, in sentence context Non-verbal: gestures, pictures
Compensation (guessing)	Cognitive (oral/written

	rehearsal, word lists, examine errors) Meta-cognitive (regular practice, planning, critical thinking/evaluation)

Discovery consists of 1) translation and 2) compensation strategies. First, translation learning involves learners figuring out the meaning of an unknown L2 word into the L1, by consulting a dictionary, the teacher or peers, which will be considered as translation strategies (Ellis, 1995). Second, considering compensation strategies, the learners guess the meaning of an unknown word. In these cases, the meaning might not be entirely clear to the learner, which is the reason it is considered as discovery.

Next, consolidation includes strategies to store words in long-term memory, consisting of 1) a contextual, 2) cognitive and 3) meta-cognitive strategies (based on and adapted from Schmitt's 1997 classification). First, the contextual strategy includes inferring the meaning of words from the context, which can be verbal or non-verbal (Ellis, 1995). Verbal context incudes target words arranged in themes, in the context of a sentence, visualised words and audio. A picture or gestures are examples of non-verbal context. Prince (1996) writes that figuring out the meaning of words from context aids the use of these in other contexts. Three reasons are given for this: 1) the learner is required to develop vocabulary learning strategies; 2) vocabulary learned in context makes the L2 learner aware of the fact that words are not used as an entity but are part of discourse; 3) contextual information gives insight into how a lexical item is employed (Prince, 1996). Second, the cognitive strategy includes written and oral rehearsal of new words, designing and studying (individual) word lists, and examining errors (Segler, Pain, & Sorace, 2002). In the cognitive strategy the learner manages the individual learning process (Yang & Wu, 2015). Third and last, the metacognitive strategy comprises regular practice, planning and critical thinking about vocabulary learning by the L2 learner (Schmitt, 1997, as cited in Segler et al., 2002; Oxford, 1996; Rasekh & Ranjbary,

2003). Repetition of words aids vocabulary retention (Hulstijn, 2001). In line with Ericsson (2006), deliberate practice with repetition is a good means to consolidate words into memory.

Relating the five different types of strategies to the processing level, the translation and compensation strategy have a low level of analysis (i.e., these strategies take words on the individual level instead of relating it to other semantic concepts), whereas the contextual, cognitive and meta-cognitive strategies gradually increase in depth of processing with the metacognitive strategy the most likely to lead to long-term vocabulary retention (Ellis, 1995).

2.3 E-learning and vocabulary learning strategies

Several studies explored vocabulary learning in an online (e-learning) environment. E-learning on these platforms requires regular repetition, personalised input and online access, often accompanied with verbal and non-verbal context. Hulstijn (2001) points at the advantages of e-learning: it can be used to practice words on a regular basis, the L2 learner can follow the progress on each lexical item, and the programme determines whether or not a word needs repetition. These factors give learners insight in their learning progress, make the student aware of the necessity of deliberate practice and ensure that learners are less likely to experience boredom.

Chen and Chung (2008) conducted research on vocabulary retention using a personalised e-learning programme for learning English vocabulary. Like for W&B, the algorithm was based on the *item response theory* (IRT), which means that content is continuously adapted to the ability of the L2 learner. In addition, the programme takes into account the learning memory cycle, implying that words should be repeated in regular intervals, facilitating retention. The participants in the study were 15 Taiwanese third-year university students in China with English as their second language (ESL). After their vocabulary knowledge was determined in a pre-test, the participants used a mobile phone with

the programme for 5 weeks. Vocabulary learning was assessed by asking L2 learners to fill in the correct word in the gap in the sentence, also testing the spelling of the words. The vocabulary review tested word recognition and retention of word meaning, where one correct word was chosen from related lexical items. This was followed by a post-test to determine the number of words that were learned, including the number of repetitions of each word. Next, a questionnaire was conducted asking general experience using the programme, the learner's their attitude towards it, and questions about vocabulary learning including self-assessment. Overall, the findings indicated that using leisure time to practise and remember vocabulary facilitated by the mobile phone that can be used anywhere was an effective way to improve vocabulary knowledge. Concerning individual variation, learners who had chosen to review all the vocabulary that was learned scored better in number of words retained compared to those who had not reviewed all the words. This indicates the importance of reviewing all words to retain them in memory. Relating this to this thesis, it is relevant to address in the interview whether and how the L2 learners experience the review of words in class and W&B.

Thornton and Houser (2005) investigated English vocabulary learning via email on mobile phones with 44 Japanese university students participating. Vocabulary exercises including 100 words in total were regularly sent by email on mobile phones to the students in the experimental group, which was used to ensure continual access to the words, facilitating practice by the learners. The control group received the same vocabulary, however, the words were offered on paper or via the computer. Results showed that the L2 learners in the experimental group had learned a significantly greater number of words compared to the control group. Furthermore, 71 percent of the participants favoured learning via e-mail on mobile phones more than via the computer. In addition, nearly all subjects experience learning vocabulary via e-mail as instructive. The findings are relevant to the current study to the extent that better and more access to vocabulary by e-mail stimulates practice of vocabulary

and word retention. In W&B learners need to practice and can do this at home, which is expected to lead to more vocabulary learning compared to learning vocabulary in classroom situations. However, the studies by Chen & Chung (2008) and Thornton and Houser (2005) did not focus on vocabulary learning strategies, but only investigated whether practice at home aided vocabulary retention.

In an article on multimedia learning, Mayer (2003) reviews research findings of vocabulary learning studies, showing that learning words in combination with pictures leads to "deeper learning" (p. 127), compared to being exposed to words without pictures words. This was found in both e-learning and learning from books. Mayer defines "deep learning" as "learning that leads to problem-solving transfer" (2003, p. 127). Two conditions are described as favourable for learning vocabulary: 1) words together with pictures; 2) an environment intended to learn with a purpose. The second aspect implies that the student becomes an autonomous, self-sufficient learner able to transfer (vocabulary) knowledge to other situations. Related to this, Mayer (2003) considers multimedia learning or e-learning as a way "that increases the power of human cognition" (p. 137). In connection with this, learning vocabulary in W&B with pictures might facilitate deep processing targeting autonomous learners using metacognitive vocabulary learning strategies. Although the article by Mayer (2003) is relevant for learning words hand in hand with pictures, it does not specifically deal with L2 learning. However, it is relevant for the current study investigating the preference of pictures or gestures in e-learning and both classroom situations.

Ybarra & Green (2003) likewise stress the importance of contextual vocabulary learning including visual context to aid comprehension, pointing at e-learning environments as being a helpful means to provide contexts. In addition, the authors write that e-learning platforms can implement several learning strategies and styles (p. 2). Ybarra and Green (2003) refer to a study by Kang & Dennis (1995) conducting research on vocabulary

development of South Korean fifth-grade early learners with ESL. The participants were divided into three groups with each group learning English vocabulary using computers with either 1)learning definitions of words, 2)pictures or 3) context. The instructional strategy in the first group can be considered as translation learning as the definition was given in the L1. The second group received a picture besides the definition given in group 1. No information is given on whether the words were nouns or verbs. Next, the third group received the new word embedded in a written context, after which a definition and picture were shown. The interesting findings revealed that immediately after the training, the first and second group outperformed the third group. Yet, after several sessions the group receiving written context exceeded the scores of the other groups. A final test on vocabulary retention showed the same results. Although it is not clear after how much time this test was administered, the authors regard this as long-term retention. The final test revealed that the context group had retained the most words compared to the other two groups. The results imply that translation learning and vocabulary learning with pictures (group 1 and 2) aid vocabulary retention on the short-term. In addition, although written context seems to make word learning initially more difficult, the result is better in the long-term. Connected to the levels of processing, written context in combination with a translation and picture seems to lead to the deepest level compared to the strategies used in the first two groups. Whereas the above-mentioned study dealt with three instruction types in which the students could not choose their favourite strategy, the next study is more related to the choice of several learning strategies by ESL learners.

A study by Yang and Wu (2015) investigated several vocabulary learning strategies of individual words in and outside an e-learning environment (*My English Vocabulary Assistant* or *MyEVA*), with 93 Taiwanese undergraduate students who were not English majors participating. The goal was to find out whether these strategies lead to improvement in

vocabulary. Four different strategies were compared: the environment in basic mode; MyEVA in preference condition, an online dictionary and paper dictionary. In the first mode learners could choose any strategy (e.g. the flashcard strategy or the use of imagery). In the second mode the participant initially chose a preferred strategy for each word, with the programme offering that specific strategy for each word afterwards. Both conditions in MyEVA were based on a 'mixed-modality' approach, inspired by Schmitt's (1997) learning strategies in the category consolidation. Eight strategies with an increasing difficulty level were included. A pre-test determined the vocabulary knowledge of the 36 words. After this test the participants were divided into a group of good and poor learners based on the score in the pre-test to find out whether proficiency lead to different use of strategies. In week 2 the students spent 80 minutes in total on vocabulary learning, followed by a post-test in the week after to find out the number of words learned. Results revealed that in general, the preference strategy was the most efficient to learn words. Specifically, the proficient L2 learners were found to benefit from the preference condition compared to the basic mode, whereas the less proficient students failed to choose the strategy of preference, leading to no significant difference between the first and second mode, and a lower vocabulary growth (Yang & Wu, 2015). The findings of this study are relevant to the extent that selecting a preferred strategy facilitates vocabulary retention, especially for proficient learners. Following from this, for the current study the proficiency level of the students might reveal a different preference of vocabulary learning strategies compared to poorer learners.

From the above-mentioned literature, only one study (by Kang & Dennis, in Yang & Wu, 2015) took into account vocabulary learning in an e-learning environment with young children. This observation signifies a clear gap in research into vocabulary learning strategies in e-learning environments with young children. Furthermore, as far as is known, the existing literature only deals with ESL learners with an L1 other than Dutch. In addition, no study

compared learning strategies in classroom and e-learning situations, which is discussed in the next paragraph.

2.4 Classroom and mobile vocabulary learning

Concerning learning English vocabulary by L1 Dutch children in primary school, a research project by EarlyBird and the UvA on learning English words using a mobile phone for students in grade 5 in primary school using the EarlyBird programme was conducted consisting of two studies by Sandberg, Maris and Hoogendoorn (2014). The studies dealt with vocabulary learning in classroom compared to e-learning. As one of the few studies into this topic for learning English in Dutch primary schools, it served as the basis for the development of W&B.

The first study (*Mobile English Learning* or *MEL1*) investigated whether learning English by 51 nine-year-old children using a smartphone application supports formal vocabulary learning in school, which was confirmed. In comparison with the children learning vocabulary in class without using the application, the children using the application were found to have learned significantly more vocabulary. This implies that the vocabulary learned in class (i.e., by formal learning) is retained to a greater degree when being exposed to it to a greater extent outside the school context. However, the amount of time using the application at home declined per day during the two weeks, which was explained by the authors as a drop in motivation ‘due to a lack in engagement and flow’(Sandberg et al., 2014, p.119). However, no exact information is given about the time the students played the games at home, nor about the total time the participants spent on learning. The essential aspect of *flow* implies that a player is kept intrinsically motivated by experiencing complete gratification in playing the game, which can be attained by e.g. increasing in difficulty level without the exercises being

too easy or difficult (Murphy, 2011). Related to this, for the current study it is relevant to take into account the difficulty level the children experience in learning vocabulary using W&B.

The follow-up study (*MEL2*) examined whether an added gaming context with rewards and the inclusion of adaptation improved vocabulary learning and motivation compared to a group using MEL1. Fifty-five children aged 9 years participated. Concerning the adaptive aspect, each word was assigned a difficulty level, namely ´easy´, ´neutral´ and ´difficult´. Depending on the (in)correctness of each given answer, the following item presented was adapted to be easier or more difficult. A pre- and post-test before and after the two weeks of using the application was conducted to gain insight into the number of words attained in this period (Hoogendoorn & Philipsen, 2013; Sandberg et al., 2014). The findings showed that besides the group using MEL2 performing better in the amount of vocabulary learned, they appreciated MEL2 more than the pupils using MEL1. In MEL2, however, the students did not spend more time on the game compared to the learners in MEL1, suggesting that they have used their time more effectively compared to MEL1.

Concerning vocabulary learning strategies, these were not considered in the study by Sandberg et al., (2014), as all children using the mobile application were asked to complete the same exercises. Yet, the design of the study adopted the contextual learning approach, by teaching vocabulary in themes, in context of short texts. In addition, the words were practised in class by e.g. designing mind maps, songs and giving a class presentation in the end (p. 122). The application included pictures, videos and questions in audio and text form.

The findings of this study are highly relevant to the current study as personalized learning outside the school context lead to improvement in vocabulary skills compared to merely classroom learning. For the present study an insight can be gained in the vocabulary learning strategies the children use in both situations.

2.5 Scientific and educational relevance

Following from the above-discussed literature in chapter 2, the main scientific goal in this pioneering research is to fill the knowledge gap regarding the vocabulary learning strategies Dutch children learning English in primary school involved in the EarlyBird programme use, specifically comparing classroom and e-learning situations. In addition, this study is unique in investigating the experience in learning vocabulary from children's point of view using the semi-structured interview.

Besides the contribution to the literature, this study has practical implications for vocabulary teaching, and for improving and designing effective e-learning programmes for vocabulary learning, taking into account vocabulary learning strategies young L2 learners employ.

3. Present study

Based on the literature, one research question containing two sub questions was designed. The questions were developed in accordance with the exploratory character of the present study, in being relatively open and containing tentatively formulated hypotheses. In the questions, these five learning strategies are considered: the a) translation strategy, b) compensation strategy, c) contextual strategy d) cognitive and e) metacognitive strategy (Schmitt, 1997).

The research question is stated as follows:

3.1 Research question

Do pupils in primary education with Early English apply different learning strategies to aid English vocabulary retention in Words&Birds compared to classroom learning?

The expectation is that L2 learners use different strategies in classroom vocabulary learning compared to e-learning in W&B. This prediction is based on following two assumptions: 1) vocabulary learning in an e-learning programme such as W&B focuses on the

accomplishment of autonomous learners learning English vocabulary adapted to their own level; 2) the teacher has a more leading function in classroom learning. As all strategies aid vocabulary retention, all five vocabulary learning strategies are examined in the present study (Ellis, 1995).

One single group of learners, all users of W&B, is considered in the present study. The vocabulary learning strategies this group applies are examined in two different situations, namely 1) when learning vocabulary in class and 2) when using W&B. To investigate what learning strategies the children apply in classroom, the first sub question reads:

3.1.1. Sub question 1

What learning strategies do pupils apply in classroom situations to aid English vocabulary retention?

Hypothesis 1

It is expected that in class, children mainly use the strategies a) translation, c) contextual and d) cognitive learning. First, the translation strategy might be employed because the teacher and peers can easily be asked for translations, although this expectation is speculative. Second, as the teacher speaks mainly English during the lessons, many words are offered in context, including words that are new to learners. This forces the L2 learners to use contextual strategies to infer the meaning of unknown vocabulary. Third, the cognitive strategy is used, as children may write down unknown words, do oral or written rehearsal and monitor their (spelling) mistakes.

3.1.2. Sub question 2

What learning strategies do pupils apply in Words&Birds to aid English vocabulary retention?

This sub question includes the same single group of learners as in sub question 3.1.1.

Hypothesis 2

The expectation is that in W&B, a different combination of strategies will be applied compared to the classroom condition by the L2 learners, namely the b) compensation, c) contextual, and e) metacognitive strategies. In W&B, the a) translation strategy is not expected to be applied often, as no translations are provided in W&B, and no time is given to the learner to ask for translations. Instead, the b) compensation strategy of guessing is expected to be applied. Further, the c) contextual strategy is often used for vocabulary learning in the e-learning programme, because word knowledge is assessed in the different games with context in the form of sentence, audio, visual context, a picture and themes. Next, the d) cognitive strategy is expected not to be applied frequently, because W&B provides the written repetition of words over time and there is no space for oral rehearsal. The e) metacognitive strategy, however, might be used when students play with W&B, implying deliberate practice. Students using W&B both in class and at home are especially involved in this strategy, because they practice more often compared to students using the programme only in class (Chen & Chung, 2008).

4. Method

Methodology in vocabulary learning research

The present study attempts to combine theoretical assumptions on vocabulary learning, leaving room for young L2 learners to share their personal experience with vocabulary learning in class and W&B. Seidman (2006) writes that interviewing is an outstanding method to throw light on the experience of students. Similarly, Eder and Fingerson (2002, p.181) point out: “One clear reason for interviewing youthful participants is to give voice to their own interpretations and thought rather than rely solely on adult interpretations of their lives.” Yet, regarding the studies discussed in Chapter 2, the predominantly utilised method is testing

the students on their knowledge of vocabulary and learning strategies in an experiment without taking into account their personal experience or providing L2 learners with the opportunity to exemplify their choices.

The data will be gathered by conducting semi-structured interviews, often used in small studies. A semi-structured interview contains directed questions based on assumptions from the literature, but contains also space for open questions exploring participants' experiences (Cohen & Crabtree, 2006). An oral survey with questions based on the literature and ample room for the interviewer to explore motives behind the given answers by asking additional questions and explanations was employed. The advantage of applying this type of data gathering is that is has more flexibility compared to a structured interview (Drever, 1995) and can be used to explore new research areas (Cohen & Crabtree, 2006). Still, the experience of participants can be investigated linked to theoretical considerations, which is an advantage of a semi-structured interview over an unstructured interview (Galletta, 2013). In connection with this, the method in the present study explores the new area of vocabulary learning strategies by young children in e-learning compared to classroom conditions based on the literature.

This chapter continues with information on the participants (section 4.1), the stimuli (section 4.2) discussing the type of questions (4.2.1) and the content of the questionnaire (4.2.2). Next, section 4.3 deals with the procedure and the analysis is covered in section 4.4.

4.1 Participants

The interviews were conducted at 4 primary schools involved in the EarlyBird programme offering Early English from grade 1, where children are aged about 5 years. Per school, 4 semi-structured interviews were conducted in groups of 4 children, in grade 5, 6, 7 and 8. The reason why these four groups were included in the present study is that W&B is used by

children starting from grade 5. All participants are considered as one single group of learners, all users of W&B besides attending English lessons in class. In total, 62 participants were involved in the study, consisting of 25 boys and 37 girls aged between 9 and 12 years. No information was gathered on their language background or personal characteristics.

Concerning the young age of the children, Krikhaar (2014) found in a research project into Early English that although it can be a challenge to talk with young children about reflections on learning, this was possible for them. The participants were aged in the range from 9-12 years. To control for gender, each group of 4 participants consisted of two boys and two girls, where possible.

4.2 Stimuli (interview questions)

4.2.1. Type of questions

After the questionnaire was designed (Appendix A), these questions were embedded in a scoring list (Appendix B) on which answers on closed questions could be quickly encircled to save time. In section 4.2.2 the considerations that lead to the content of the questionnaire are discussed.

Together with the questionnaire, a scoring list with 5-point Likert scales was designed to easily score and analyse the given answers. The Likert-scale contains 5 smileys to indicate to what degree the participants agreed with each question (Appendix E). Smileys instead of numbers were chosen to connect with the children's everyday environment using smileys in digital communication. The interviewer explained the meaning of each smiley before each question requiring the scale: 1-strongly agree, 2-agree, 3-neither agree nor disagree, 4-disagree, 5-strongly disagree.

Besides closed items scored on a Likert scale, open questions were included. The closed questions contained yes/no or multiple choice. Steward and Steward (1996, as cited in

Docherty & Sandelowski,1999) found that children provide more exact information when they are asked open questions from their experience compared to ‘specific and direct yes/no questions’ (p. 181-182). This was taken into account in designing the questionnaire. To ease the scoring, direct questions were designed, but participants were asked to exemplify their answer choice by telling why a certain answer was chosen.

4.2.2. Content questionnaire (Appendix A)

The questionnaire contained Part A with questions about the subject English and W&B, and Part B with questions concerning vocabulary learning strategies.

Part A – English and W&B (10 questions)

Part A of the questionnaire consisted of general questions about learning English and specific questions about the use of W&B. First, these questions were designed to gain insight into in participant’s appreciation of English as a subject in school and of W&B (1 and 3). This might reveal students’ attitude towards learning English in both situations.

Students’ self-rated proficiency level in English was addressed by asking them to rate it on the Likert scale (2). Concerning self-assessment by young children with regard to English as L2, Butler and Lee (2010) have described that whereas children younger than seven have difficulty assessing their own performance, children aged 8-12 are able to reflect on their learning, which is becoming better as they are moving to group 8 (p. 8). Therefore, in the present study children in age group 8-12 were considered to give a valid self-assessment, although a more critical stance was taken with regard to the younger children.

The fourth question revealed information about how long W&B has been used by the school, as not all schools have used it since the start of W&B in 2015.

Question 5 and 6 addressed the frequency and place(s) of use of W&B per child. Some children were expected to use W&B only in school, whereas W&B can also be used only at

home, or in both situations. This was relevant for the investigation of the metacognitive strategy concerning deliberate practice (Ericsson, 2006). Children using the programme often were considered as being actively involved in the use of the metacognitive strategy to retain vocabulary.

Questions 7-9 gave insight into the games the students use, whether they experienced the games as difficult, and the games they appreciated. During the interview a picture of each game together with the name of the game and a screenshot of an exercise in the learning environment were taken to ensure that the children know which games they were referring to and to help them remembering the games (Appendix D).

The answers to the final question (10) revealed the difficulty level the students play at (1=easy and 3=difficult), which they can choose themselves.

Part B – Vocabulary learning strategies

This part consisted of six questions about word learning strategies in general and cognitive strategies (1a-1f), five questions about contextual learning strategies (2a-2e), six questions on translation and compensation strategies (3a-3e), and two questions on active use of vocabulary (4a-4b). As already mentioned, the metacognitive strategy was assessed in the fifth and sixth question in Part A of the questionnaire.

With regard to general and cognitive strategies, question 1a addressed how words are learned in class, and in 1b the specific learning strategies children employ were explored. Possible instances of how vocabulary is learned in class using cognitive strategies are written and oral rehearsal of new words, designing and studying (individual) word lists, and examining errors (Segler, Pain, & Sorace, 2002). Other strategies might be in accordance with those addressed by Ahmadvand and Nejadansari (2014): *Focus on form* (pronunciation, spelling, irregular grammatical patterns and collocations) and *focus on meaning* (definitions,

synonyms and antonyms). The same holds for W&B (in question 1c and 1d). Question 1e explored whether W&B aids vocabulary retention, followed by the question whether more words are learned in class or in W&B (1f).

Contextual learning strategies include inferring the meaning of words from the context, which can be verbal (themes, sentence context, visualised words, and audio) or non-verbal (a picture gestures) (Ellis, 1995). Question 2a investigated whether words in sentence context are preferred over learning words individually. This question was designed in relation to what Hulstijn (2001) writes, namely that vocabulary retention of new words is facilitated by taking into account the connections between words. Pupils were asked whether they prefer learning words embedded in a theme (in *Puzzl*) in question 2b. Question 2c explored whether visual context in the form of a picture helps vocabulary retention. This question was based on what Mayer (2003) writes that learning words combined with pictures leads to "deeper learning" (p. 127) compared to being exposed to single words without context. Ybarra & Green (2003) have likewise stressed the importance of contextual vocabulary learning including visual context to aid comprehension, pointing at e-learning environments being a helpful means to provide contexts. Next, question 2d addressed whether only hearing a word embedded in an English sentence (in *Ducktator*) helps to infer the meaning of that word. Finally, the question whether pupils remember words when it is offered in written and spoken form (in *WordoAudio*) was asked in question 2e (Ybarra & Green, 2003).

Concerning translation and compensation strategies, question 3a addressed whether pupils translate or guess the meaning of a word when they do not know it in classroom situation. The same was asked concerning W&B in question 3b. In accordance with Ellis (2005), translation learning was expected to let learners translate an unknown word in the L2 into the L1 by consulting a dictionary, the teacher or peers. Question 3c addressed whether pupils often guess the correct meaning of a word when they use this compensation strategy.

Question 3d gave insight into whether the pupils prefer translation of an English word into Dutch by the teacher. Next, question 3e addressed whether learners prefer translation by the teacher over guessing the meaning from sentence context without a translation by the teacher. Finally, 3f was a concluding question concerning learning strategies, exploring whether pupils aim to be taught new learning strategies to help remember words. The answers to question 3f were linked to the findings by Yang and Wu (2015), showing that students retained more vocabulary when they could choose the preferred strategy.

The last question pair addressed the active vocabulary use to find out if learners can use their vocabulary for communication purposes, which is an important target in vocabulary learning and learning English in general. This is in accordance with Hulstijn (2001), pointing at the necessity of using a word actively in writing or speaking. Question 4a asked whether pupils can easily use the words they learned for speaking and question 4b addressed whether more vocabulary knowledge facilitates speaking English.

4.3 Procedure

The interviews were conducted in an empty and quiet room in the school. Each interview lasted 25 minutes and was conducted in Dutch. Two interviewers were involved in the interviews: one asked the questions and the other interviewer noted the given answers and intervened when necessary. The first interviewer was the author of this study, and the second was involved in learning English spelling in W&B in a related study. The interviews were recorded with a mobile phone in order to re-listen to the open questions for the analysis. During the semi-structured interviews, the questions on the questionnaire were asked to the children. Children were asked to clarify given answers in questions containing a ‘why’ question. Four children from a class were interviewed in each interview. The reason for

interviewing children in groups is that this method is more natural for children because it prevents them from being overwhelmed by the adult researcher (Eder & Fingerson, 2002). The semi-structured interviews commenced with a short explanation of the procedure and an introduction of the interviewers' and participants' names. To grab children's attention, the interviewers showed a laminated picture of one bird representing the game *Ducktator* in W&B to the participants, asking them if they recognised the bird. Next, the researcher told the participants that during the interview only the child holding the laminated bird (called 'speech bird' for the purpose of this study) was allowed to talk, to keep the interview structured. During the interview the order in which each child answered the questions was varied to ensure that children were not likely to influence each other's answer choice.

Apart from the short introduction before the interview taking 4 minutes, the semi-structured interview contained three parts, each taking about 7 minutes: 1) an introduction with general questions about the use of W&B; 2) questions about vocabulary learning; 3) questions about spelling. The third part of the questionnaire dealing with spelling is not taken into account in the present study.

4.4. Analysis

Before the data analysis, the collected answers were put in an Excel sheet to provide an overview of the data. Answers to open questions were transcribed. In the open questions, the answers of the children in each class were taken together, and in the closed questions the answer of each individual child was taken into account, visualised in tables.

5. Results and analysis

In this section, the results and analysis are presented. Per condition or sub question (classroom, W&B), one open and several closed questions have been selected from the questionnaire that give insight into the strategies the children use. The questions that were selected provided direct insight into the learning strategies. For instance, question 4a and 4b are left out in this section as these only reveal information about the active use of English, but not on the strategies. The remaining questions serve as a means for meta-analysis to explain remarkable findings. All relevant questions are translated into English for purposes of understanding. This chapter is divided into the following sections: in 5.1, an overview of the schools and participants is given. Section 5.2 reveals the answers to sub question 1, dealing with the learning strategies children use in classroom condition. Section 5.3 deals with sub question 2, examining the strategies used in W&B. In section 5.4, the results from both conditions (i.e., classroom condition and e-learning condition in W&B) are compared.

5.1 Overview schools and participants

In this chapter, results per school (A, B, C, D) and per group (5, 6, 7, 8) are presented and analysed separately. Any noteworthy results discussed in this results section have been italicised in the tables. This concerns findings that show (un)expected results or show a clear deviation from other results in the table.

School B and D have used W&B for a few months, whereas school A and C have been working with it for more than a year. As the schools have used W&B for different periods, this might give different results concerning the learning strategies used in W&B.

Each group (5, 6, 7, 8) was taken into account as younger children might use different strategies compared to older children.

For school A, group 8 was not available for the interview, explaining the use of the n.a. in table 2.

Table 2
Overview schools and participants

			Group	5	6	7	8
School	Period involved in EB programme	Start using W&B		N=17	N=16	N=16	N=13
A	2012 – 2017 (5 years)	May 2016 (1 year, 2 months)	N=13	4	5	4	n.a.
B	2011 – 2017 (6 years)	March 2017 (4 months)	N=17	4	4	4	5
C	2011 – 2017 (6 years)	September 2015 (2 years, 2 months)	N=16	4	4	4	4
D	2012 – 2017 (5 years	April 2017 (3 months)	N=16	5	3	4	4

5.2 Sub question 1: Vocabulary learning strategies in classroom learning

This section firstly considers open question (1b) giving insight into the strategies used by learners. Secondly, the closed questions (2a, 3a, 3d, 3e) concerning the a. translation, b. compensation and c. contextual strategies are discussed.

5.2.1. Open question: 1b

Question 1b was asked to investigate which strategies the participants employ when learning vocabulary in class: “What do you do when you want to remember a word in class?”
Table 3 below presents the answers given per group, classified under the five vocabulary learning strategies derived from the literature: a. translation, b. compensation, c. contextual, d. cognitive and e. metacognitive strategies.

In general, mainly the cognitive strategies (26 occurrences) are employed in each grade and school (table 3). It should be mentioned that some sub strategies (e.g. ‘repetition’ and ‘write down’ under the cognitive strategy) occur more times, which is the reason why the

word ‘occurrences’ is used. Concerning the specific cognitive strategies, the following are used repeatedly: ‘write down’, ‘repetition’, ‘say words to yourself’. The metacognitive strategy follows the cognitive strategies with seven instances, followed by the translation, compensation and contextual strategy mentioned once. The learners behave comparably in classes, but school C has the highest number of occurrences of metacognitive strategies compared to the other schools.

Table 3
Question 1b

Grade	a. translation	b. compensation	c. context	d. cognitive	e. meta-cognitive
School A					
5				*-write down* *-say words to yourself*	*-practise*
6				*-write down* *-find meaning in textbook*	
7				*-write down meaning* *-repetition* *-first and last letter*	
School B					
5				*-repeat in head* *-look at the complete word*	
6				*-repetition* *-improve mistakes*	
7				*-repeat in head*	
8		-guess		*-repetition*	*-mnemonic*
School C					
5				*-write down* *-repetition*	*-practise at home*
6				*-consonants* *-write down* *-oral rehearsal*	*-categorise words into sound groups*
7					*-resemblance Dutch*
8				*-write down* *-repetition* *-word list*	*-resemblance other words*
School D					
5			-picture	*-repetition in head* *-write down*	

6				*-spelling*	
7	-translate				*-resemblance to other languages*
8				*-write down* *-pronunciation*	
Total occurrences	1	1	1	26	7

5.2.2. Closed questions: 2a, 3a, 3d, 3e

Question 2a

Question 2a "I learn words quicker from sentence context compared to when the same word is shown without context" examines whether the participants prefer learning words out of context over sentence context.

Tables 4a and 4b reveal the number of participants choosing individual and sentence context.

Table 4a
Question 2a - school

School	individual	sentence
A	5	8
B	*4*	*13*
C	*11*	*5*
D	10	6
Total	30	32

In general, no type of learning was clearly preferred above the other. However, some differences are visible between schools and groups. School B prefers sentence context (N=13) over individual words (N=4), while school C prefers individual words (N=11) over sentence context (N=5) (table 4a). This result may be linked to the finding (to be discussed further in question 3e) that school C clearly prefers translation by the teacher over finding out the meaning in sentence context, whereas learners in school B have no clear preference.

Table 4b
Question 2a - group

Group	individual	sentence
5	17	0
6	5	11
7	4	12
8	4	9
Total	30	32

Concerning the groups, the table shows that learners in group 5 all preferred individual word learning (N=17), whereas in the other groups sentence context was valued more than individual words (table 4b).

Question 3a

This question "What do you do when you do not know a word in class?" is in table 5a and 5b. The given answers are classified into the five categories 'self' (or find out the meaning themselves), 'guess', 'teacher', 'combination'. Participants in the 'combination' category combined first looking words up themselves with asking the teacher or classmates, or guessing. Children not knowing what to do are labelled 'n.a'.

Table 5a
Question 3a – school

School	self	guess	teacher	combination	n.a.
A	1	0	*5*	*5*	2
B	*9*	0	2	6	0
C	2	0	8	6	0
D	0	*7*	*9*	0	0
Total	12	7	24	17	2

Learners behave in a different manner across schools (table 5a).Table 5a and 5b show that the strategy used mainly is asking the teacher (N=24), after which follow a combination of strategies (N=17) and finding out the meaning without help (N=12). This shows that the learners have a great reliance on the teacher in asking for a translation. The most striking result is from school D being the only school in which participants apply the compensation

strategy of guessing (N=7). The school also has the highest number of learners asking the teacher for help (N=9).

Table 5b
Question 3a – group

Group	self	guess	teacher	combination	n.a.
5	3	*2*	*9*	2	1
6	3	*2*	*6*	4	1
7	2	*3*	5	6	0
8	4	0	4	5	0
Total	12	7	24	17	2

Concerning the groups, group 5 has the highest number of learners asking the teacher for a translation (N=9), gradually declining to N=4 in group 8. The guessing strategy (only employed in school D, see table 5a) is spread over the groups 5, 6, and 7 (N=2; N=2; N=3). Group 8, however, does not use the guessing strategy.

Question 3d

Question 3d "I appreciate it when the teacher translates an English word into Dutch." addresses the translation strategy. Table 6 shows the three answer categories the learners used: 'yes', 'no', or 'sometimes'. In general, most participants appreciated a translation by the teacher (N=34), whereas 19 learners were not in favour of a translation into Dutch at all. Only a few (N=9) children ask for a translation sometimes.

Concerning the schools, it is firstly relevant that in school D all but one (N=15) learners prefer a translation into Dutch. Secondly, school C has the highest number of answers (N=9) in the 'no' category compared to school A, B and D. These results of school C and D might be related to the self-rated proficiency of the learners. Comparing the overall self-ratings in English (question 2, Part A) from school C (1.71/5) with school D (2.56/5), it is clear that learners assign themselves a higher score concerning their proficiency compared to school D.

Table 6
Question 3d

School	yes	no	sometimes	Group	yes	no	sometimes
A	6	5	2	5	7	8	2
B	6	4	7	6	6	8	2
C	7	*9*	0	7	*15*	1	0
D	*15*	1	0	8	6	2	5
Total	34	19	9	Total	34	19	9

Question 3e

Question 3e "I find it easier when the teacher translates an English word into Dutch compared to when I need to infer the meaning only from sentence context" examines whether learners prefer the translation strategy ('yes') above the contextual strategy ('no'). Table 7 reveals that the translation strategy (N=28) is preferred over the contextual strategy (N=24), although this is a small difference. However, it is striking that children in school C and D clearly prefer the translation strategy over the contextual strategy (N=10 versus N=6; N=11 versus N=5), respectively. Yet, no learners in school A have given answers in the 'yes' category, and chose 'sometimes' twice. It needs to be mentioned that no information is available from the four participants under 'n.a.' (question 3e was unintendedly skipped by the interviewer in grade 5). Inclusion of these participants might have changed the answers in school A.

Concerning the groups, the most striking results are from group 8 with a clearly higher preference for 'yes' (N=11) compared to 'no' (N=2). Learners in group 8 seem to prefer the translation strategy over the contextual strategy.

Table 7
Question 3e

School	yes	no	both	some-times	n.a	Group	yes	no	both	some-times	n.a
A	0	*7*	0	2	4	5	5	4	4	0	4
B	7	6	4	0	0	6	8	8	0	0	0
C	*10*	*6*	0	0	0	7	4	10	0	2	0
D	*11*	*5*	0	0	0	8	11	2	0	0	0
Total	28	24	4	2	4	Total	28	24	4	2	4

5.2.3. Conclusion sub question 1

This section concludes on section 5.2, providing an answer to sub question 1: *What learning strategies do pupils apply in classroom situations to aid English vocabulary retention?*. The expectation was that from the five strategies, the a) translation, c) contextual and d) cognitive strategy would be mainly employed in classroom condition.

The results from the open question (1b) indicated that the cognitive strategy was used the most, the metacognitive strategy to a lesser extent, and the other strategies only once.

Concerning question 2a, individual (or translation) learning and contextual learning were both used to a similar extent.

Next, the results from question 3a revealed that that the learners have a great reliance on the teacher in asking for a translation when they come across an unknown word in class. In connection with this, the answers to question 3d revealed that learners appreciate a translation by the teacher in case they do not know the meaning of a word. The guessing strategy was only applied by school D, spread over the different classes except in group 8.

Finally, question 3e showed that learners prefer the translation of a word by the teacher over guessing its meaning in sentence context, though this was a small difference.

Taken together, the open question revealed that learners mainly use the d) cognitive and e) metacognitive strategies in class, whereas the answers to the closed questions showed that the a) translation and c) contextual strategies were also used. The b) guessing strategy was not employed often. Hypothesis 1 is confirmed, yet the finding that the metacognitive strategy was also applied in class, as the open question revealed, was unexpected.

5.3 Sub question 2: vocabulary learning strategies in W&B

In this section first the open question (1d), giving insight into the strategies that are used is considered, followed by the closed questions (5, 6 (Part A); 1d, 1e, 2b, 2c, 2d, 2e (Part B)),

specifically concerning the a. translation, b. compensation, c. contextual and e. metacognitive strategies.

5.3.1. Open question: 1d

Question 1d was designed to investigate which strategies the participants employ when learning vocabulary in W&B: "What do you do when you want to remember a word in W&B?". Table 8 below gives insight into the answers given per group, classified under the five vocabulary learning strategies.

Table 8
Question 1d

Group	a. translation	b. compensation	c. context	d. cognitive	e. meta-cognitive
School A					
5			-audio -visual	*-type* *-say out loud* *-repetition*	*-practise*
6					*-resemblance to Dutch*
7	-translation			*-spelling (Ducktator)*	
School B					
5					
6	-translation				
7			-sentence	*-spelling* *-pronunciation*	
8			-feedback with meaning in sentence context (Twinny)		*-practise*
School C					
5		-guess		*-consonants*	*-practise*
6	-translate			*-write on paper afterwards*	*-practise*
7	-translate				
8				*-spelling*	*-practise*

					-resemblance to other words
School D					
5			-picture		
6				*-spelling*	
7	-translate			*-repetition*	
8		-guess			*-practise*
Total occurrences	5	2	5	11	8

Table 8 reveals that in general, mainly the cognitive strategies are employed in each school and group (11 occurrences). Concerning the specific cognitive strategies, the following are used repeatedly: ‘type’, ‘spelling’, ‘repetition’. Next, the metacognitive strategy is used eight times, with ‘practise’ and ‘resemblance other words or languages’ as most importance sub strategies. The translation and contextual strategy have five occurrences, followed by the compensation strategy with two instances. The classes behave fairly consistently, but school C has the highest number of occurrences of metacognitive strategies (N=4) compared to the other schools. The same was shown in classroom condition (question 1b, table 3). The children seem to know the importance of practice to aid remembering words in class and in W&B. A reason why school C uses the metacognitive strategy more than the other schools is that the school used other products from *Oefenweb* for learning Dutch and mathematics and has received support from *Oefenweb* in using this. In addition, the school team is actively involved in e-learning (K. Philipsen, personal communication, July 4, 2017).

5.3.2. Closed questions: 5, 6 (Part A); 1d, 1e, 2b, 2c, 2d, 2e (Part B)

Questions 5 and 6 from part A deal with the place and frequency children use W&B, giving insight into the metacognitive strategy of practise. The other questions address the other four strategies.

Question 5

The answers to question 5: “Do you play on W&B only at school or also at home?” revealed that some children receive time to play W&B in ‘class’ besides the regular English lessons, while others play only at ‘home’ or ‘both’ (see table 9). In general, about half of the participants (N=32) use W&B only in class, and the other half (N=28) uses W&B both in class and at home. Two participants use the e-learning game only at home.

Comparing the schools, one striking result concerns school C: all but one (N=15) of the learners use W&B both in school and at home, while the participants in the other schools have a high frequency of learners only using W&B in school. This result suggests that students in school C practise more often compared to the learners in other schools, thus employing the metacognitive strategy of practice.

Concerning the groups, no clear differences are visible, except from the finding that group 5 contains the highest number of learners (N=11) using W&B in class and at home, while N=6; N=6; N=5 used W&B in both situations in grade 6-8, respectively. This finding implies that the metacognitive strategy is used by this age group more than by the other groups. A reason might be that these children have just started using W&B, as W&B targets users starting from group 5), stimulating children to play often to increase in proficiency level quickly, and ensuring that games with a higher difficulty are opened up. In addition, the gaming environment might be very attractive to these young learners, while the older learners have got used to W&B or find the content of W&B too easy, making it less attractive to play at home.

Table 9
Question 5

School	class	home	both	Group	class	home	both
A	4	2	7	5	6	0	*11*
B	14	0	3	6	8	2	6
C	1	0	*15*	7	10	0	6
D	13	0	3	8	8	0	5
Total	32	2	28	Total	32	2	28

Question 6

The question "How often do you play on W&B?" deals with the frequency of playing W&B (table 10). As the given answers ranged from one to eight times a week, the distinction between 1-4x and 5-8x has been made. In general, most learners (N=40) use W&B less than five times a week, and the other players use it more than five times (N=22).

Comparing the schools, school B stands out in relation with the other schools, as all learners use W&B more than five times a week. These players are involved in the metacognitive strategy the most concerning the frequency of use, compared to the other schools.

With regard to the groups, no noteworthy differences are revealed in table 10.

Table 10
Question 6

School	1-4x	5-8x	Group	1-4x	5-8x
A	13	0	5	11	6
B	0	*17*	6	11	5
C	12	4	7	11	5
D	15	1	8	7	6
Total	40	22	Total	40	22

Question 1e

This question: "W&B helps me to remember words." was asked to examine whether the learners regard the e-learning game as useful to aid word retention. Table 11 reveals that in general, nearly all participants (N=50) gave the positive answer 'yes' to the question, with no striking differences between the schools.

With regard to the groups, it is remarkable that all learners in grade 8 answered 'yes'. Participants answering 'no' or 'sometimes' clarified that W&B was too easy for them, and that they learned more new words in class. However, it still seems that for learners in group 8 W&B aids vocabulary learning.

Table 11
Question 1e

School	yes	no	sometimes	Group	yes	no	sometimes
A	9	0	3	5	15	1	1
B	13	0	4	6	8	3	5
C	13	2	1	7	14	0	2
D	15	2	0	8	*13*	0	0
Total	50	4	8	Total	50	4	8

Question 2b, 2c, 2d, 2e

These questions deal with the contextual strategies 'theme', 'picture', 'audio' and 'audio-visual' context. The questions were asked using a five-point Likert scale with 1=completely agree and 5=completely disagree. The top row of tables 12-15 indicates the score given on the scale. The learners having indicated that they did not play the game(s) *Puzzl*, *Ducktator* or *WordoAudio* are classified as 'n.a.'.

Question 2b: "How do you evaluate learning words in *Puzzl* with a theme such as sports, numbers or time?". Table 12 shows that most learners (N=33) positively evaluate the inclusion of a theme, followed by 15 learners assigning a '2'. No outstanding differences between schools and groups were found.

Table 12
Question 2b

School	1	2	3	4	5	n.a.	Group	1	2	3	4	5	n.a.
A	9	2	0	0	0	2	5	8	2	2	0	1	4
B	6	7	1	0	0	3	6	10	2	3	0	1	0
C	12	2	0	0	1	1	7	9	7	0	0	0	0
D	6	4	5	0	1	0	8	6	4	1	0	0	2
Total	*33*	*15*	6	0	2	6	Total	33	15	6	0	2	6

Question 2c: "Seeing a picture (in *Puzzl*) helps me remembering a word." provides insight into the appreciation of non-verbal context. Table 13 reveals that 32 participants appreciate the addition of a picture to a high extent, after which follows the rating '2' (N=18), which is comparable to the answers given to question 2b.

Concerning the groups, group 8 differs from the other group in that the ratings ‘1’, ‘2’ and ‘3’ are given to a similar extent (N=3; N=4; N=4 respectively). A reason might be that learners in grade 8 have a larger vocabulary compared to the other groups, which implies that many words are already known, lowering the reliance on pictures to infer meaning.

Table 13
Question 2c – picture

School	1	2	3	4	5	n.a.	Group	1	2	3	4	5	n.a.
A	9	1	1	0	0	2	5	9	4	0	0	0	4
B	1	*11*	2	0	0	3	6	7	7	1	0	1	0
C	12	1	1	0	1	1	7	13	3	0	0	0	0
D	10	5	1	0	0	0	8	*3*	*4*	*4*	0	0	2
Total	32	18	5	0	1	6	Total	32	18	5	0	1	6

Question 2d: “When I hear a word in *Ducktator* in the sentence, I always know its meaning.” examines the preference of audio to aid vocabulary retention. The most outstanding result is that most learners assign the rating ‘2’ (N=30), with ‘1’ coming in after it with 13 occurrences. Compared to answers given to the previously discussed questions (2b, 2c), audio seems to be regarded as less helpful than themes and pictures, although audio is still evaluated positively. Asking the learners why they chose a rating lower than ‘1’, many evaluated that the audio in W&B does not work very well, containing hitches.

Table 14
Question 2d - audio

School	1	2	3	4	5	n.a.	Group	1	2	3	4	5	n.a.
A	2	9	1	1	0	0	5	7	5	2	1	1	1
B	5	7	3	0	0	2	6	3	10	2	0	1	0
C	1	10	2	0	1	2	7	3	10	1	1	0	1
D	5	4	5	1	1	0	8	0	5	6	0	0	2
Total	13	30	11	2	2	4	Total	13	30	11	2	2	4

Question 2e: “I remember words better when I both see and hear it, like in *WordoAudio*.” addresses the learners’ appreciation of audio-visual context. Table 15 reveals that 27 users assign the rating ‘1’, followed by 16 learners giving a ‘2’. This shows that the combination of audio and visual context is considered as helpful to remember words. As this

game is opened for more proficient learners, eleven participants were categorised under ‘n.a’, because they did not have access to *WordoAudio* yet. Participants rating a ‘4’ or ‘5’ explained that the combination of audio and visual context was confusing for them.

Table 15
Question 2e – audio-visual

School	1	2	3	4	5	n.a.	Group	1	2	3	4	5	n.a.
A	5	2	0	0	0	*6*	5	10	6	0	0	0	1
B	10	2	4	0	0	*1*	6	5	3	0	*1*	*1*	6
C	10	0	0	1	1	*4*	7	9	4	2	0	0	1
D	2	12	2	0	0	0	8	3	3	4	0	0	3
Total	27	16	6	1	1	11	Total	27	16	6	1	1	11

Question 3b

Question 3b: “What do you undertake when you do not know a word in W&B?” addresses the strategies the learners use when they come across an unknown word in W&B, classified into ‘self’ (i.e., find out the translation afterwards), ‘guess’, ‘teacher’, ‘classmate/family’ and ‘combination’. Table 16 shows that the strategy used the most is guessing (N=27), followed by finding out the word’s meaning themselves (N=19). The teacher plays a minor role in giving a translation (N=2), although nine participants prefer a combination of the four strategies.

With regard to the schools, a remarkable result is found for school D: all but one (N=15) participants use the guessing strategy. This might be explained by the answers the children gave to question 1a, revealing that in class, the children often learn English using guessing. This strategy might be transferred to W&B.

Taking into account the classes, a noticeable result concerns grade 5, where ten participants employ the guessing strategy, which is more than in the other groups.

Table 16
Question 3b

School	self	guess	teacher	classmate/ family	combi- nation	n.a.
A	7	5	0	0	1	0
B	4	3	1	1	7	1
C	8	4	1	2	0	1
D	0	*15*	0	0	1	0
Group	**self**	**guess**	**teacher**	**classmate/ family**	**combi- nation**	**n.a.**
5	1	*10*	0	2	4	0
6	7	5	1	1	1	1
7	5	8	0	0	3	0
8	6	4	1	0	1	1
Total	19	27	2	3	9	2

5.3.3. Conclusion sub question 2

Based on the results discussed in section 5.3, an answer to sub question 1: *What learning strategies do pupils apply in Words&Birds to aid English vocabulary retention?* is given. The expectation was that from the five strategies, the b) compensation, c) contextual, and e) metacognitive strategies are employed in W&B.

First, open question 1d showed that the d) cognitive strategy was used most often, followed by the e) metacognitive strategy. The a) translation and c) contextual strategy were used less than strategy e, and the b) compensation strategy was hardly applied.

Second, answers to the first closed question (5) revealed that about half of the learners use W&B only in class, and the other half uses W&B both in class and at home, implying that the metacognitive strategy of practice was employed actively by half of the participants. In connection with this finding, question 6 revealed that about two third of the learners use W&B less than five times a week, and the other third uses it up to eight times, indicating that a smaller part of the learners uses the metacognitive strategy of practise often.

Third, question 1e showed that nearly all participants answered that W&B aids them to retaining vocabulary.

Fourth, question 2b and 2c indicated that contextual learning in the form of a theme and picture was positively evaluated with the rating ‘1’ by most learners. Audio context (in question 2d) was predominantly rated with a ‘2’ instead of a ‘1’ on the scale, mainly because the voice quality was poor, being disturbing instead of having an aiding function. Similar to the positive evaluation of context as a theme and picture, audio-visual context was rated mainly with a ‘1’, although for some learners this combination of audio and visual context was too difficult.

Fifth, concerning the question 3b the most chosen strategy when learners do not know a word in W&B is guessing, after which they find out the meaning themselves (usually by means of translation).

Summing up, the open question revealed that the cognitive and metacognitive strategy occurred most frequently, followed by the translation and contextual strategy. The closed questions showed that the compensation, contextual and metacognitive strategies were often applied. The results confirmed hypothesis 2, although the open question showed the unexpected use of the cognitive strategy.

5.4. Comparison of condition A and B

In this section, the results related to sub question 1 (discussed in section 5.2) and sub question 2 (discussed in section 5.3) are compared. Before this comparison, the answers to question 1f: “Where do you learn more words” are examined (table 17).

5.4.1. Question 1f

This question gives insight into where the children think they learn the most words. Answers could be divided into four categories: ‘W&B’, ‘class’, ‘both’ and ‘home/games’.

Overall, the table shows that most words were learned in class (N=26), followed by W&B (N=21). Some children indicated they learn an equal number of words in class and W&B (N=8). Seven learners learn most words at home by means of movies and games.

Table 17
Question 1f

School	W&B	class	both	home/ games	Group	W&B	class	both	home/ games
A	3	8	1	1	5	6	6	5	0
B	4	6	2	*5*	6	2	*11*	2	1
C	6	4	5	1	7	*10*	5	0	1
D	8	8	0	0	8	3	4	1	*5*
Total	*21*	*26*	8	7	Total	21	26	8	7

Comparing the schools, it is remarkable that school B contains the most (N=5) participants choosing the 'home/games' category. Further analysis indicates that all learners from school B in grade 8 chose this category. This result is possibly linked to the finding that school B is the only school in which all learners (N=17) play with W&B 5-8 times per week (table 10). Much practice might lead to a better word knowledge, making the words in class and W&B too easy for these learners. Instead, they find new challenges of learning vocabulary in games and movies.

Taking into account the different groups, it is striking that in group 6 most participants (N=11) learned their words in class, whereas in group 7 most learners chose W&B as condition where they learned most words (N=10). In group 5 however, the choices in the first three categories are evenly divided (N=6; N=6; N=5). Group 5 also contains the most occurrences of 'both' (N=5) compared to the other groups. A possible explanation is that for learners in group 5 vocabulary input is complementary in class and in W&B, in contrast with groups 6 and 7. The difference between group 6 and 7 might be explained related to the findings in table 11 (question 1e): "W&B helps me to remember words.". Learners in group 7

clearly confirmed this question, whereas participants in group 6 chose ‘no’ or ‘sometimes’ more often compared to group 7.

5.4.2. Comparison open questions 1b and 1d

Question 1b and 1d examined which vocabulary learning strategies were used in class and in W&B respectively. Table 18 shows the number of occurrences of each strategy in both conditions. Overall, the classroom condition contains more occurrences of strategies compared to W&B (N=36; N=31 respectively). Furthermore, the cognitive strategy has the highest frequency in both conditions (N=26; N=11 respectively) followed by the metacognitive strategy (N=7; N=8). A difference between both conditions is that in W&B more variation in strategies is visible. It seems that W&B lends less use to cognitive strategies, and more use of the translation and contextual strategies compared to classroom learning.

Table 18
Comparison question 1b and 1d

strategy	class (1b)	W&B (1d)
a. translation	1	5
b. compensation	1	2
c. contextual	1	5
d. cognitive	26	11
e. metacognitive	7	8
Total	36	31

5.4.3. Comparison closed questions 3a and 3b

Question 3a (table 5a and 5b) and 3b (table 16) examined which strategies the learners use when they come across an unknown word in class and in W&B respectively. The results in both conditions are compared in this section. Explicit numbers are found in the tables.

A remarkable general finding is that in class, the translation strategy or asking the teacher for a translation is employed the most, followed by a combination of strategies and finding meanings themselves. Guessing does not occur often. In W&B however, the guessing

strategies are employed most often, followed by looking up the meaning themselves and using a combination of strategies.

Concerning the schools, school D stands out in being the only school where the guessing strategy is used in class. Moreover, this school is exclusive in that all but one learners use this compensation strategy in W&B.

With respect to the groups, the findings from group 5 are remarkable as the translation strategy is mainly used in class, whereas the guessing strategy is applied in W&B.

6. Conclusion

An answer to the research question: "*Do pupils in primary education with Early English apply different learning strategies to aid English vocabulary retention in Words&Birds compared to classroom learning?"* is given in this chapter.

In accordance with the expectation, L2 learners use different vocabulary learning strategies in class compared to W&B. All five strategies were employed in both conditions; however, differences were found in the extent to which each strategy was applied in class compared to W&B. Furthermore, a discrepancy between the answers to the open and closed questions was found as both hypotheses were confirmed in the closed questions, whereas the open questions added unexpected information. In addition, differences between schools and classes were found, elaborated on in chapter 7.

The translation, contextual and cognitive strategy were preferred in class, whereas the compensation strategy of guessing, the metacognitive strategy of practise, and the inclusion of context (sentence, audio, visual, a picture and theme) were valued as helpful to remember words in W&B. Although the cognitive strategy was mentioned most often in class and W&B compared to the other strategies, it seems that W&B lends less use to cognitive strategies, with some being replaced by especially the translation and contextual strategies. The

metacognitive strategy comes second after the cognitive strategy in both conditions, revealing that the essence of practice to remember words is used in both conditions.

Taking into account the unexpected frequent use of the cognitive and translation strategies in W&B, this suggests that the e-learning game stimulates the use of all strategies, whereas in class the use of the compensation strategy is more restricted due to the role of the teacher providing translations.

7. Discussion

This chapter deals with methodological considerations (section 7.1), the present study's implications theory and practice (section 7.2), and the scope of the study, including suggestions for further research (section 7.3).

7.1 Methodological considerations

Concerning the methodology, the semi-structured interview was a useful method in this exploratory qualitative study in providing the possibility to ask questions based on the few studies that addressed this topic, while simultaneously leaving room for further questions to explain given answers by the participants. In addition, the Likert-scale was a good tool to examine the evaluation of learners' experience, as for instance, the learners were able to explain why certain a certain rating was preferred over the other rating. Regarding the questions, question 6 asking how often the learners use W&B per week should have been expanded with an extra question examining how long they play, to get a more complete picture of how much time learners spend on using it, giving a more precise information about the metacognitive strategy of practice.

With regard to the participants, these were selected by the teachers on all schools except for school D. The reason for selection was often a higher proficiency in English. This

implies that not all children were in similar situations, and that the results may only be generalised to young learners with a higher level of English. Another issue is that besides their self-reported proficiency and appreciation of English, nothing is known about participants' linguistic background, which might have led to individual differences. Finally, the schools did not have the same starting position in the number of years being involved in the EarlyBird programme and in the period W&B had been used. This might have caused differences in learners' proficiency.

7.2 Implications for theory and practice

In connection with the literature, one reason why differences in learning strategies in class and W&B were expected was that an e-learning programme such as W&B is linked to autonomous learning, implying not much help from the teacher concerning translations, stimulating reliance on context and guessing to learn and remember vocabulary (Mayer, 2003; Winkel, 2014). The findings suggest that learners indeed show this autonomous behaviour in W&B in using the compensation strategy of guessing and the contextual strategy, whereas they rely on translations by the teacher in class, showing more dependency on the teacher. Another reason is that W&B stimulates deliberate practice to improve learners' proficiency in English vocabulary (Ericsson, 2006). The results revealed that the metacognitive strategy of practice was used, yet with differences between place and frequency of use between the different schools.

Concerning the type of questions (open vs closed), the answers to the open questions revealed different patterns in strategies compared to the closed questions. An important difference for condition B (W&B) was that the compensation strategy was mentioned twice in the open question 1d, while closed question 3b showed that the compensation strategy was preferred in W&B. A possible explanation for this difference is that the learners apply the

guessing strategy unconsciously, as in the open question they hardly came up with this strategy, whereas the closed question was more directed at uncovering the use of the guessing strategy. This possibly shows a benefit of using both open and closed questions to reveal more detailed information about the learning strategies. If these young learners use the guessing strategy unconsciously, only asking open questions might not be suitable to gain insight into participants' behaviour. Steward and Steward (1996, as cited in Docherty & Sandelowski, 1999), however, found that children give more precise information to open questions from their experience compared to 'specific and direct yes/no questions' (p. 181-182). The above-mentioned discrepancy between the answers to the questions is not in line with what the authors found, and can be taken into account in further studies.

The results showed several interesting differences between schools.
First, open question 1b revealed that school C has the highest number of occurrences of metacognitive strategies in class compared to the other schools. This can be possibly linked to the fact that this school has used W&B the longest time (i.e., more than 2 years) in comparison with school A, B, and D. A possible suggestion is that, as the students have been involved in the metacognitive strategy of practice the longest period, this might have caused more use of this strategy in class. Moreover, question 5 revealed that school C is the only school using W&B both in school and at home, making the learners involved in actively learning English outside the school context. Furthermore, school C was also found to contain the higher number of answers rejecting the translation strategy in class and preferring the contextual strategy instead (in question 3d). Learners in this school were found to assign a high self-rated proficiency in English. It seems that when a higher proficiency implies a better word knowledge, this might lead to less need to ask for a translation and more reliance on context.

Second, concerning the metacognitive strategy in W&B, school B was found to stand out in relation with the other schools, as all learners use W&B more than five times a week (question 6). These players are involved in the metacognitive strategy the most concerning the frequency of use, compared to the other schools. The reason for this might be rooted in the background of the school, which is 'into' English in being actively involved in the development of English in school by means of a new training, with the teachers embracing English and focusing on 21st century skills (K. Philipsen, personal communication, July 4, 2017). This implies that schools might play an important role in stimulating the frequent use of W&B.

Third, question 3a and 3b showed that school D is the only school where the guessing strategy is used in class. Moreover, this school is exclusive in that all but one of the learners used the compensation strategy in W&B. For this strategy, a relation between the use in class and in W&B is suggested, although it is not clear whether using in class stimulates the use in W&B or vice-versa.

Differences between groups were also visible. Question 2a revealed that learners in group 5 all preferred individual word learning in class when an unknown word occurs, whereas in the other groups, sentence context was valued more than learning words without context. An explanation might be that group five learners have a smaller vocabulary in English, making it more difficult to infer meaning from context. The deeper level of processing contextual learning involves, might be too difficult for learners in group 5 (Craik & Lockhart; 1972; Ellis, 1995). It seems that younger learners in primary education are aided more by the discovery strategy of translation, whereas older learners rely more on the consolidation strategy of context (Schmitt, 1997, as cited in Yang & Wu, 2015). Although some studies found the benefits of context to learn vocabulary (Mayer, 2003; Ybarra & Green, 2003; Yang & Wu, 2014), for younger learners context does not always seem to aid

vocabulary learning when they do not know the meaning of a word. This has practical implications for teachers, to provide translations to these younger learners instead of only offering new words in context.

One practical implication is related to the finding that the audio context in W&B was not always considered as helpful by the learners due to hitches in voice quality. This implies that audio in W&B and in other e-learning programmes should be well-developed to aid vocabulary learning instead of distracting the learner. In addition, some participants, especially older learners, indicated that they prefer higher level content to be challenged and learn more new vocabulary. From this follows that content in e-learning programmes should be made suitable for young learners with a higher proficiency in English to prevent learners getting bored and stop playing. Concerning the above-mentioned practical issues, these were already addressed by Hirsh-Pasek, Zosh, Golinkoff, Gray, Robb, and Kaufman (2013), in that content in educational games should aid learning instead of distracting or boring the learner.

7.3 Scope present study and future research

The results of the present study can be generalised to young learners in group 5-8 aged 9-12 years, learning L2 English via explicit instruction in primary school classrooms. As all schools were involved in the EarlyBird programme, results are explicitly related to these schools, whereas learners in regular Eibo schools might show different findings due to less involvement in English in primary school.

To develop a full picture of vocabulary learning strategies used by young learners in class and e-learning programmes, additional studies on this topic are recommended. First, more schools and participants should be included to receive a more elaborate picture of the learning strategies used. Furthermore, the present study did not focus on the analysis of vocabulary learning strategies used by each individual learner. As learners have different

learning styles (Sebba et al., 2007), the use and preference of certain vocabulary learning strategies might differ within learners, which could be revealed in future research into individual vocabulary learning strategies. Insight into these has implications for didactics in classroom, as teachers can adapt to learner's preferred strategies. Besides, future studies should consider whether the selection of participants by the teachers based on proficiency or motivation is preferred, as in the present study most learners were selected. Moreover, to gain insight into the real level of English in class and W&B, learners' results in class and W&B should be taken into account. Next, besides EarlyBird schools, Eibo schools could be included in studies to find out whether type of English programme (EarlyBird vs Eibo) reveals differences between vocabulary learning strategies employed. Related to testing learners' vocabulary level in Eibo and EarlyBird schools, Brink (2015) compared vocabulary knowledge in both programmes by means of tests, finding a higher vocabulary level in learners attending EarlyBird schools. Furthermore, researchers are advised to attend English classes to see how vocabulary is learned in classroom. Moreover, related to the metacognitive strategy of practice, studies should examine if teachers push learners to practise English in class and W&B (extrinsic motivation), or if they are intrinsically motivated to learn English (Murphy, 2011). Next, concerning the five vocabulary learning strategies, the current study has mainly paid attention to the main strategies. Further research might be conducted investigating the sub strategies learners use. Finally, as in this study differences in results between groups were found, these could be examined further, providing insight into whether starting age and years of experience in English influence the strategies learners employ.

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9. Appendices

9.1 Appendix A – Questionnaire

Herkennen jullie deze vogel?

Deel A - Algemeen deel Words&Birds – 2 min

1. Hoe leuk vind je Engels (op school)?
2. Hoe goed ben je in Engels?
3. Wat vind je van W&B? (Likert)
4. Hoe lang gebruiken jullie W&B al?
5. Speel je alleen op school met W&B of ook thuis?
6. Hoe vaak speel je met W&B?
7. Welke spellen speel je (het meest)?
8. Welk spel vind je het leukste? Waarom?
9. Welk spel vind je moeilijk? Waarom?
10. Op welke moeilijkheidsgraad speel je in W&B?

Deel B – Woordenschat en strategieën - 7 min

strategieën: algemeen/cognitief

1a. Hoe doe je dat, woordjes leren in de klas?
1b. Waar let je op als een woord wilt onthouden in de klas?
1c. Hoe leer je woordjes bij W&B?
1d. Waar let je op als een woord wilt onthouden in W&B?
1e. W&B helpt mij om woordjes te onthouden
1f. Waar leer je meer woordjes? (In de klas/W&B)

strategieën: context/thematisch/visueel/audio

2a. Ik leer woordjes sneller in de zin dan als los woordje.
2b. Hoe fijn vind je het om woordjes te leren in Puzzl met een thema zoals sport, nummers, tijd?
2c. Het zien van een plaatje (bij Puzzl in W&B) of gebaren (klas) helpt mij bij het onthouden van een woord.
2d. Als ik een woordje bij Ducktator hoor in de zin, weet ik altijd wat het betekent.
2e. Ik onthoud woordjes beter als ik een woord zie én hoor, zoals in WordoAudio.

strategieën: vertalen/raden

3a. Wat doe je als je een woord niet kent in de klas?
3b. En in W&B?
3c. Als ik een woord raad, heb ik het meestal goed
3d. Ik vind het fijn als de juf/meester een Engels woord in het Nederlands vertaalt.
3e. Ik vind het makkelijker als de juf/meester een Engels woord vertaalt dan wanneer ik de betekenis moet raden in de zin.
3f. Zou je graag manieren van de juf/meester willen leren om woordjes te onthouden?

actief gebruik woordenschat

4a. Ik kan zelf makkelijk wat vertellen met woordjes die ik geleerd hebt.

4b. Ik praat makkelijker in het Engels als ik meer woorden ken.

9.2 Appendix B – Scoring list

Scorelijst

Naam school: _____
Plaats:_____
EarlyBird school: ja/nee (zo ja, sinds wanneer:_____)
Datum:_____
Interviewer:_____ Groep:_____
Bijzonderheden:
_____

Algemeen deel
Herkennen jullie deze vogel?

1. Hoe leuk vind je Engels (op school)?

(naam)			

2. Hoe goed ben je in Engels?

3. Wat vind je van W&B? (Likert)

4. Hoe lang gebruiken jullie W&B al?

5. Speel je alleen op school met W&B of ook thuis?

school/thuis/beide	school/thuis/beide	school/thuis/beide	school/thuis/beide

6. Hoe vaak speel je met W&B?

… x per week	… x per week	… x per week	… x per week

7. Welke spellen speel je (het meest)?

1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8

8. Welk spel vind je het leukste? Waarom?

1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8

9. Welk spel vind je moeilijk? Waarom?

1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8	1/2/3/4/5/6/7/8

10. Op welke moeilijkheidsgraad speel je in W&B?

1/2/3	1/2/3	1/2/3	1/2/3

Woorden
strategieën: algemeen
1a. Hoe doe je dat, woordjes leren in de klas?
1b. Waar let je op als een woord wilt onthouden in de klas?
1c. Hoe leer je woordjes bij W&B?
1d. Waar let je op als een woord wilt onthouden in W&B?
1e. W&B helpt mij om woordjes te onthouden

ja/nee	ja/nee	ja/nee	ja/nee

1f. Waar leer je meer woordjes? (In de klas/W&B)

klas/W&B	klas/W&B	klas/W&B	klas/W&B

strategieën: context/thematisch/visueel/audio

2a. Ik leer woordjes sneller in de zin dan als los woordje.

ja/nee	ja/nee	ja/nee	ja/nee

2b. Hoe fijn vind je het om woordjes te leren in **Puzzl** met een thema zoals sport, nummers, tijd? (Likert-schaal)

2c. Het zien van een plaatje (bij **Puzzl** in W&B) of gebaren (klas) helpt mij bij het onthouden van een woord (Likert-schaal)

2d. Als ik een woordje bij **Ducktator** hoor in de zin, weet ik altijd wat het betekent (Likert-schaal)

2e. Ik onthoud woordjes beter als ik een woord zie én hoor, zoals in **WordoAudio** (Likert-schaal)

strategieën: vertalen/raden

3a. Wat doe je als je een woord niet kent in de klas? (Vragen aan de juf/raden/zelf opzoeken)

juf/raden/zelf	juf/raden/zelf	juf/raden/zelf	juf/raden/zelf

3b. En in W&B?

juf/raden/zelf	juf/raden/zelf	juf/raden/zelf	juf/raden/zelf

3c. Als ik een woord raad, heb ik het meestal goed

ja/nee	ja/nee	ja/nee	ja/nee

3d. Ik vind het fijn als de juf een Engels woord in het Nederlands vertaalt.

ja/nee	ja/nee	ja/nee	ja/nee

3e. Ik vind het makkelijker als de juf een Engels woord vertaalt dan wanneer ik de betekenis moet raden in de zin.

ja/nee	ja/nee	ja/nee	ja/nee

3f. Zou je graag manieren van de juf willen leren om woordjes te onthouden?

ja/nee	ja/nee	ja/nee	ja/nee

actief gebruik woordenschat

4a. Ik kan zelf makkelijk wat vertellen met woordjes die ik geleerd hebt (Likert-schaal)

4b. Ik praat makkelijker in het Engels als ik meer woorden ken.

ja/nee	ja/nee	ja/nee	ja/nee

Spelling

In de les.

1a. Heb je het in de les ook wel eens over de spelling van Engelse woorden?

ja/nee	ja/nee	ja/nee	ja/nee

1b. Wat doe je dan in zo'n les?

_____

Leerstrategieën.

2a. Vind je het lastig om de goede spelling van woorden te onthouden?

ja/nee	ja/nee	ja/nee	ja/nee

2b. Wat voor manieren gebruikt je juf om moeilijke woorden te onthouden?

_____

2c. Helpt het als je een woord heel vaak moet overschrijven?

ja/nee	ja/nee	ja/nee	ja/nee

2d. Als je een woordje fout hebt in W&B kijk je dan ook waarom je het fout had?

ja/nee	ja/nee	ja/nee	ja/nee

2e. En na een dictee in de klas?

ja/nee	ja/nee	ja/nee	ja/nee

2f. Denk je bij het spellen van een Engels woord wel eens aan de Nederlandse spelling?

ja/nee	ja/nee	ja/nee	ja/nee

2g. Ik vind het fijn als de juf de verschillen tussen de Nederlandse en Engelse spelling uitlegt.

Moeilijkheid.

3a. Noem eens een woord met lastige spelling? _____

3b. Waarom is dit lastig?_____

3c. Kom je dit soort woorden ook in W&B tegen?

ja/nee	ja/nee	ja/nee	ja/nee

3d. Vind je W&B makkelijker of moeilijker dan Engels in de klas? Waarom?

makkelijker/moeilijker	makkelijker/moeilijker	makkelijker/moeilijker	makkelijker/moeilijker

3e. Gebruik je weleens woordjes in de klas die je met W&B hebt leren spellen?

ja/nee	ja/nee	ja/nee	ja/nee

3f. Gebruik je weleens woordjes in W&B die je in de klas hebt geleerd?

ja/nee	ja/nee	ja/nee	ja/nee

Spellen.

4a. Vind je W&B een goed spel om spelling mee te leren? Waarom?

ja/nee	ja/nee	ja/nee	ja/nee

4b. Ik vind het spel **Chooser** goed om spelling mee te leren. (likert-schaal)

4c. Vind je het vervelend om fout gespelde woorden te zien?

ja/nee	ja/nee	ja/nee	ja/nee

4d. Krijg je hetzelfde soort woorden in dictee in de klas als bij **Ducktator**?

ja/nee	ja/nee	ja/nee	ja/nee

4e. Ik vind het lastig als ik een Engels woord moet opschrijven dat ik alleen hoor. (likert-schaal)

4f. De uitspraak van een woord is een goede indicatie voor de spelling ervan. (Als ik een woord hoor weet ik ook hoe ik dit moet opschrijven.) (Likert-schaal)

4g. Hoe kom je er anders achter hoe een woord gespeld moet worden?

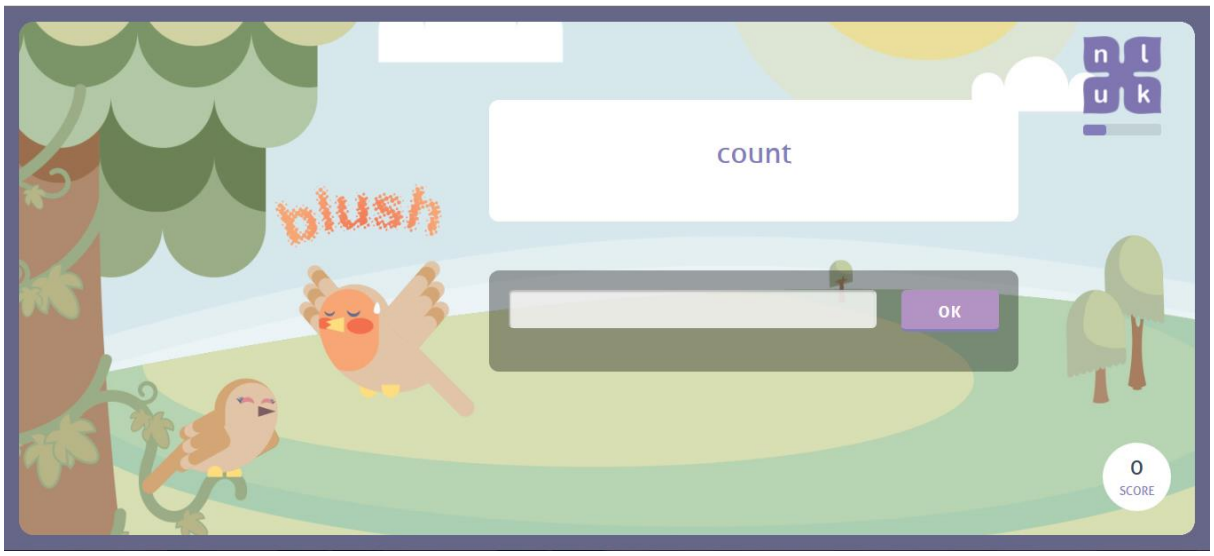
_____

4h. Ik leer een woord correct te spellen door de letters in de goede volgorde te zetten zoals bij **Puzzl**. (Likert-schaal)

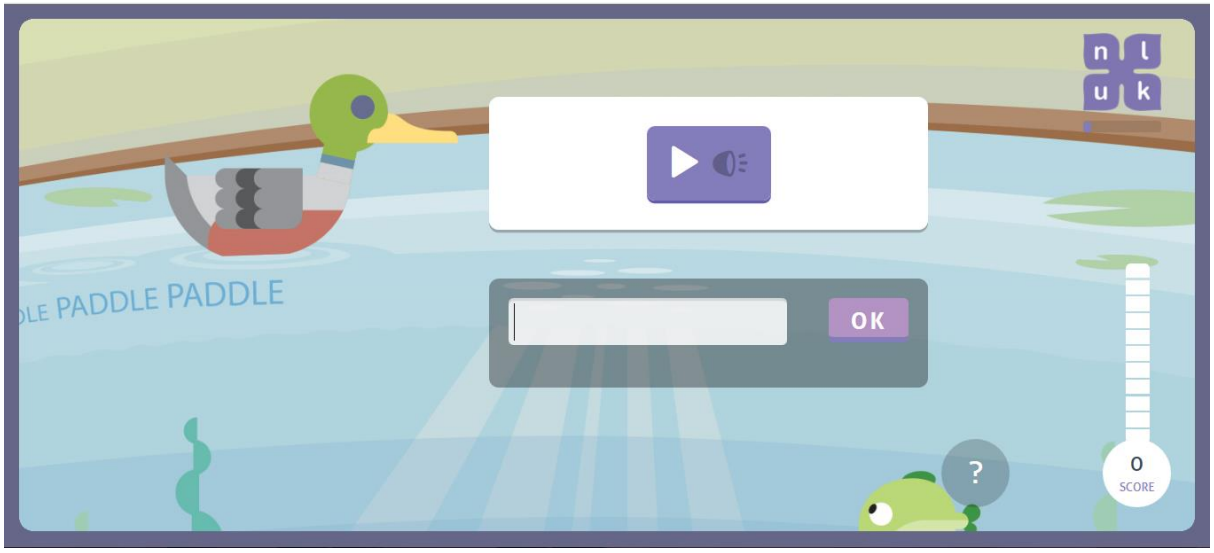
9.3 Appendix C – Speech bird

9.4 Appendix D – Print screen games Words&Birds

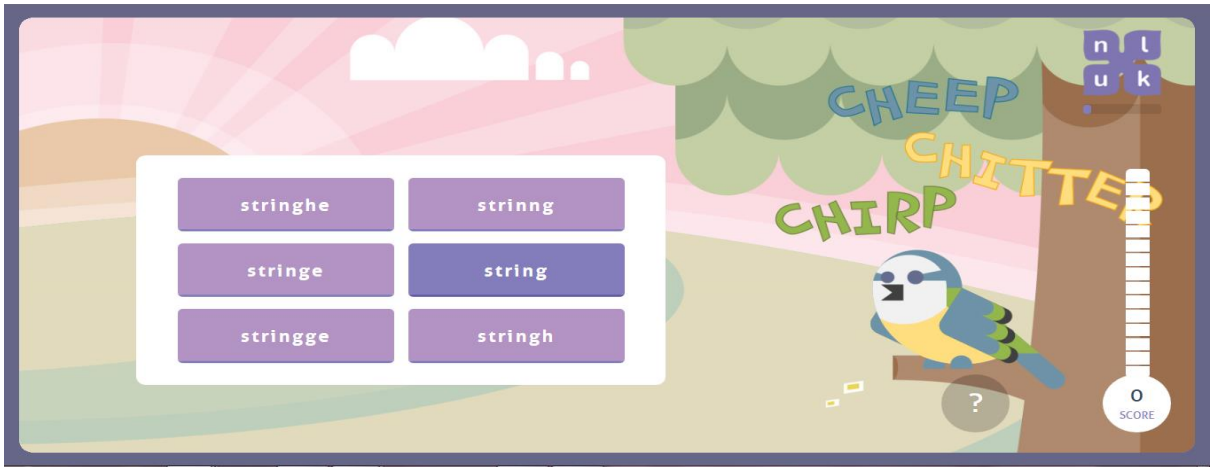
1. Flashy



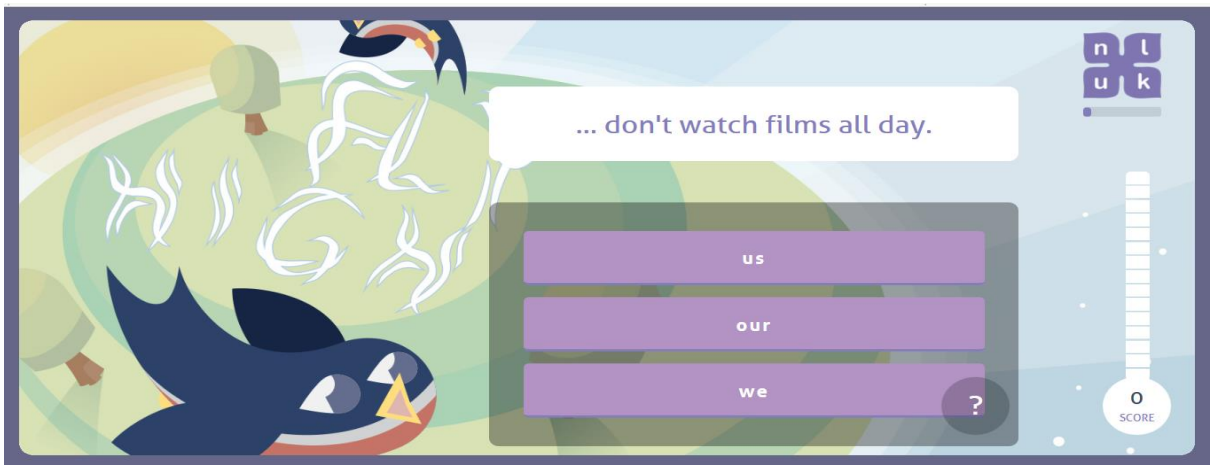
2. Ducktator



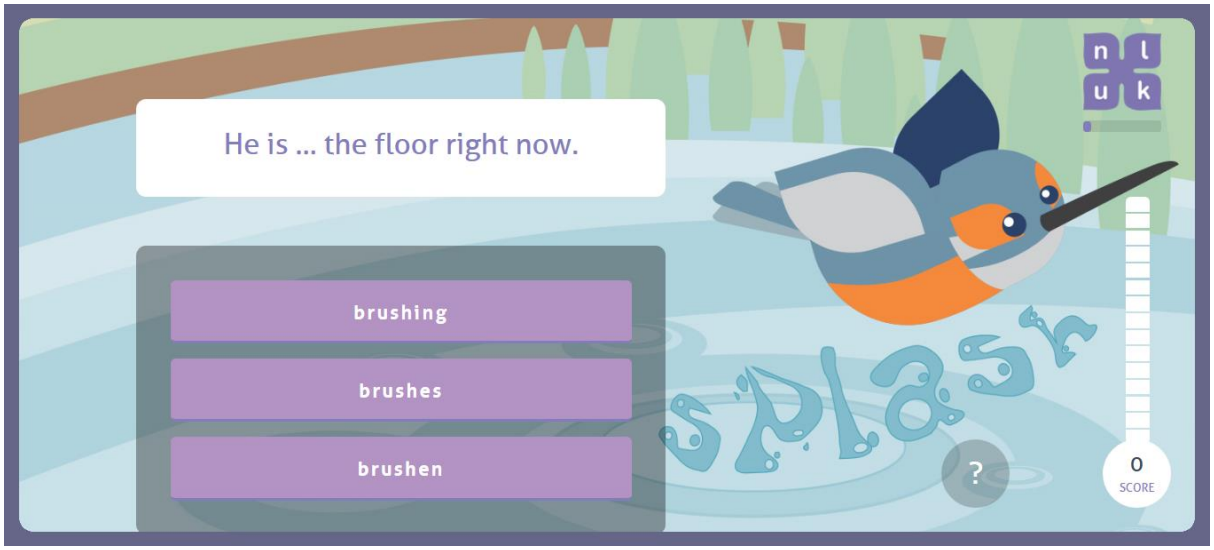
3. Chooser



4. Shaper



5. Verby

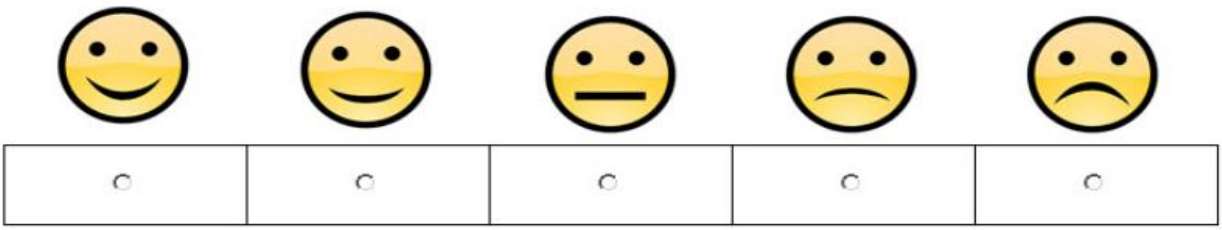


6. Puzzl

7. WordoAudio

8. Twinny

9.5 Appendix E – Likert scale (SIMS, 2017)



1 2 3 4 5