

**The *CodeTaal* Intervention:
Its Effectiveness, Suitability and Treatment's Fidelity**

by

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Abstract

This thesis investigates the effectiveness, treatment fidelity and suitability of a cross-linguistic intervention for Dutch children with DLD acquiring EFL. Similar interventions already exist for L1 acquisition, and recent research has shown that children with DLD benefit from explicit instruction and support of cross-linguistic transfer, but it is still unclear how this kind of intervention would work for Dutch children with DLD learning EFL. Students from two special-education schools participated. To investigate the effectiveness, scores from a grammar test were analysed. Results show no significant difference between the control and intervention group. To assess the suitability, proficiency scores and participation scores were correlated. It is found that Dutch proficiency correlates positively with coping well in the intervention. Additionally, results show that there are no significant differences in the participation between hearing-impaired and non-hearing-impaired participants. Lastly, a semi-structured interview, with the teacher of the relevant class, and observation notes were analysed to investigate the treatment fidelity. The analysis shows that three major themes need to be considered before implementing the intervention: learning ability, time and *MetaTaal*. A limitation of this thesis is the short time in which the interventions were carried out. Further research on the effectiveness and suitability of the intervention is needed.

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1. Introduction

Since 2012 English has been a mandatory subject in special education primary and secondary schools in The Netherlands. Children are required to obtain a basic level of English at the end of primary school (Geurts & Hemker, 2013, as cited in, van Oene, 2019), but according to Sijp (2018, as cited in, van Oene, 2019), children diagnosed with DLD lack in their English proficiency when making the change from primary to secondary education. Little research has focused on methods that could benefit these children in acquiring a better EFL proficiency. In a collaborative research project, between researchers from UiL-OTS and Koninklijke Kentalis, an intervention for Dutch students with DLD learning English as a Foreign Language (EFL) has been created: *CodeTaal* (Niemann, 2020). This intervention, partly based on Shape Coding (Ebbels, 2007), combines explicit instruction and visual cues. Interventions using these same principles have been found to be beneficial for children with DLD (Zwitsersloot, Wijnen, van Weerdenburg & Verhoeven, 2015; Ebbels, Marić, Murphy & Turner, 2014). In addition, the intervention also focuses on cross-linguistic comparison between Dutch and English.

The *CodeTaal* project started in September 2019. The 4th, 5th and 6th grades of two special education primary schools, both part of the Koninklijke Kentalis, participated. All groups were found to perform similarly on the first pretest (Lahdo, 2020), after the pretest the intervention stage started. One of the two schools received the intervention, the other school acted as the control group. The intervention was taught by a researcher under supervision of an ambulant tutor from the Koninklijke Kentalis. Each lesson of the intervention consisted of two parts. The first part was a cognate game, in which the children were explicitly made aware of certain cognate pairs, and learned the rules regarding cognates, so that they are able to put this information to practice when acquiring new vocabulary. The second part focused on teaching children grammatical forms. This syntax instruction made structures visually

comprehensible by using colour-coded shapes, and the cross-linguistic transfer systems were supported by explicitly comparing sentences between Dutch and English. This intervention, in this cohort, lasted for 12 weeks (excluding two weeks without a lesson) with one 45-minute lesson each week, after which the posttests were conducted. One 6th grade class from the control school (hereafter referred to as ‘the second cohort’), started receiving the intervention after the posttest. These lessons were taught by the author of this thesis and an MA-student, supervised by the teacher of the class. This intervention should have lasted from February until May, but due to the Covid-19 pandemic it was discontinued after four lessons. Initially the plan was to investigate both treatment fidelity and effectiveness in the second cohort, but because of the pandemic it was decided to investigate the effectiveness based on results of the first cohort. Treatment fidelity will be investigated based on the limited number of observations in the second cohort.

2. Theoretical Background

2.1 What is DLD?

Developmental Language Disorder (DLD; Specific Language Impairment (SLI) in older literature) is an innate disorder affecting the language and speech development. It is prevalent in around 7% of the population (Bishop, 2010), occurring slightly more in boys than in girls; 8% opposed to 6% (Leonard, 2014). The cause of the disorder is still unknown, however recent research points at possible genetic factors (Leonard, 2014). It is known that factors such as a hearing-impairment or insufficient language input do not underlie the disorder (Bishop, 1992). It is noticeable over time that DLD differs from a lack of language input, as children with a language delay will overcome their delay after they have received sufficient input. In contrast, children diagnosed with DLD will continue to face problems with their language and speech production, often in combination with certain social difficulties, such as

having trouble with managing emotions and experiencing anxiety (Leonard, 2014), which is partly the reason why it is important to develop interventions for this target group.

2.1.1 L1 and L2 Acquisition

Children with DLD experience different problems when acquiring a first (L1) or second (L2) language. The first area of difficulty in L1 acquisition is morphology. Leonard, Miller & Gerber (1999) have found that children with DLD lacked in their finite-verb morphology in spontaneous speech when compared to their typically developing (TD) peers. Another piece of evidence regarding morphology in spoken language has been found by Oetting & Horohov (1997). Analysis of spontaneous speech samples and elicitations using a video-tape probe has shown that children with DLD produce less past-tense forms than the matched TD children, but their past-tense system is “normally constructed” (p.72). As well as having problems with morphology in spoken language it has been found that children with language learning disabilities also encounter problems with morphology in written language, specifically with finiteness marking (Windsor, Scott & Street, 2000). Although it is widely believed that children with DLD make more errors regarding morphology and is often seen as a “central area of deficit” (Thordardottir, 2016, p. 97), it is found that this is not the case for Icelandic children diagnosed with DLD (Thordardottir, 2016). It has been found that children with DLD make slightly more morphological errors than their TD peers, but a diversity analysis has shown that both groups are similar in their use of morpheme types. These results might have been found because Icelandic is a “highly inflected language” (p. 84). In a study by Tribushinina & Dubinkina (2012) Russian children with DLD have been found to not lag behind TD children, in the context of degree markers, as much as children who speak other languages do. The morphological richness of a language might therefore be an advantage for children with DLD.

Problems with L1 acquisition do not only occur at the word-level, but are also present at the sentence-level. Hestvik, Schwartz & Tornyova (2010) have found that children with DLD exhibit problems with immediate gap-filling, when processing relative clauses, but it has also been found that comprehension is similar for both groups of participants. They suggested that children with DLD do not lack in their grammatical knowledge, but do have problems with processing. Mak et al. (2017) have found similar processing difficulties in the domain of discourse connectives, but in contrast to the previous mentioned study, a lack of grammatical competence has also been found.

Another issue that is prevalent is that children with DLD often possess a small vocabulary. This is the result of having trouble with learning novel words (Nash & Donaldson, 2005), although Leonard et al. (1982) has found that children with DLD acquire the same number of experimental words as TD children do. This finding is interesting as it is usually believed that children with DLD require more exposure before acquisition occurs (Tomblin, Mainela-Arnold & Zhang, 2007). A study by Windfuhr, Faragher & Conti-Ramsden (2002), has found that children with DLD express greater difficulty with learning verbs than nouns. Over the course of 4 weeks they have found that children with DLD learn verbs at a slower rate than the matched TD children. The children with DLD need double the time the TD children need to acquire the same number of verbs. This finding is contradicted by evidence from Horohov & Oetting (2004). They have found that English speaking children with DLD, just as the TD children included in the study, learn more verbs than nouns. The combination of these different acquisition problems does not only lead to problems in day to day life, but can also have an impact on educational outcomes. A study which focusses on students in the United Kingdom has found that 44% of students with DLD obtains at least one qualification at the end of secondary school, but for the TD group this number is twice as high

(Conti-Ramsden, Durkin, Simkin & Knox, 2009, p. 31). The issues discussed do not only occur in acquiring a L1 but also radiate to acquiring a L2.

The two big issues children with DLD run into when acquiring a second or foreign language, are having an impaired procedural memory system and having difficulty with cross-linguistic awareness. These two issues will be discussed in detail in the next subsections, as these act as principles for the *CodeTaal* intervention. Other issues include, for example, the amount of support given to children with DLD who are acquiring two or more languages. It has been found that children with DLD have “reduced access to language programs that support bilingualism” (Bird, Trudeau & Sutton, 2016, p. 68), even when it is quite important, especially for children with DLD, that they receive as much support as possible. Another issue is that the L1 of children is not always supported as much as it should be (Bird, Trudeau & Sutton, 2016, p. 67). This is problematic as the L1 of children can act as a base for transfer, which is explained in more detail in the subsection 2.3, but if it is not supported enough this resource might become unavailable.

2.2 Explicit Instruction

When learning a new language, memory plays an important role. The memory system can be divided into two different systems: procedural memory and declarative memory. Procedural memory is commonly called the ‘how’ memory, this system is important in remembering how to do certain tasks. An example from language acquisition would be learning grammar.

Learning the syntax of a language usually happens completely unconsciously. For example, Dutch has the main-clause word-order *Subject, Verb, Object*. Most children will use this word-order correctly when speaking Dutch because they have heard this sequence repeatedly in the input they received. They learned this implicitly without thinking about what order to use. This is also the reason why the topic word order is not discussed explicitly in primary schools. In contrast to this procedural learning which happens implicitly, declarative learning

is an explicit process. The declarative memory system is the memory system that contains information on 'what'. In language acquisition these are, for example, vocabulary or the exceptions to the grammar rules. This information is explicitly taught in language lessons.

Ullman & Pierpont (2005) propose the Procedural Deficit Hypothesis. In this hypothesis they state that the procedural learning mechanisms are damaged in children with DLD. Since procedural learning happens implicitly, the hypothesis argues that children with DLD struggle with learning implicitly. As these children do not notice regularities in language as fast as TD children. Children with DLD need more exposure to notice these regularities (Tomblin et al., 2007).

Ullman & Pierpont go even further, and say that these children, compensate with their declarative memory, due to the damaged procedural memory, and possibly even have a better declarative memory than TD children. This statement is supported by Lukács, Kemény, Lum & Ullman (2017), as they have found evidence for an enhanced declarative system within children with DLD. In a recognition memory study, they have found that children with DLD improved in their memory of non-verbal items, as opposed to the TD children who did not improve in their memory. This leads to the argument that children with DLD would benefit from explicit instructions in the language lessons to support the declarative learning system.

Explicit instruction can also be enhanced by using visual support. Lum, Gelgic & Conti-Ramsden (2010) have found, contradictory to the previous mentioned findings, an impairment in the verbal declarative memory system. However the nonverbal declarative memory system does not seem to be affected. This would suggest that children with DLD could benefit from visual support when learning a new language. Schneider & Evers (2009) justify the need of using "multisensory structured instruction" (p. 58) for at-risk English learners. This instruction needs to combine explicit instruction in combination with visual and auditory signals, and always keeping cross-linguistic transfer in mind.

Some studies have looked at the effects of interventions using explicit instruction combined with visual support in the L1. One of these interventions is MetaTaal (Zwitsers et al., 2015). This intervention focuses on helping children with DLD with the acquisition of relative clauses, by integrating explicit instruction and visual support, in the shape of Lego bricks, in the language classroom. They have found positive results for the group of participants involved. Ebbels (2007) has created a similar intervention called Shape Coding, where colour-coded shapes were used as visual support, which has also been found to be effective to teach several grammatical rules (Ebbels, 2007; Ebbels et al., 2014). Both these interventions focus on strengthening the L1 language skills of the participants, Dutch and English respectively. However, research into interventions supporting EFL acquisition is non-existent as there is no intervention for learning EFL yet. *CodeTaal* tries to fill this gap, by creating an intervention that uses explicit instruction and visual cues to support Dutch L1 children in the acquisition of EFL.

2.3 Cross-Linguistic Transfer

Positive cross-linguistic transfer is the process of using L1 knowledge when learning a L2. This transfer only happens when a particular amount of knowledge is obtained in the L1. This is explained in the Developmental Interdependence Hypothesis (Cummins, 1979) which states that to successfully acquire a L2, a sufficient amount of knowledge about the L1 has to be achieved. A similar hypothesis is the FL Linguistic Coding Deficit Hypothesis (Sparks & Ganschow, 1993). According to this hypothesis if there is a deficit of specific knowledge in the L1 the information cannot be transferred to the L2, and this deficit in the L1 is therefore the cause of problems in the development of the L2.

Transfer occurs in multiple areas, one of these being lexical transfer. Lexical transfer involves a cognate facilitation effect. The *CodeTaal* intervention supports lexical transfer by using cognates. Cognates are two words in two different languages that are perceived as being

similar. The two words always have a “formal resemblance” (Carroll, 1992, p. 94), this can either be in written or spoken language. An example, taken from the first lesson in the CodeTaal intervention, would be the Dutch – English cognate pair: *melk* – ‘milk’. The two words appear similar in written form, but when spoken also sound extremely similar (/mɛlk/ - /milk/). In contrast, the Dutch word *lopen* translates to ‘walk’ in English, and these neither look or sound the same, and are therefore not a cognate pair.

Cognate strategy has proved useful, for example, for Spanish-speaking learners of English when they are searching for the meaning of a difficult English vocabulary item (Dressler, Carlo, Snow, August & White, 2011). When participants are unsure of the meaning of an English word they try to search for a similar word in Spanish, and the meanings of the words are often similar. Interestingly, the strategy was only applied by those participants, of Dressler’s et al. (2011) study, who had explicitly been taught the strategy. Helman (2004) brings attention to the need of using “commonalities” (p. 459) in the EFL classroom. EFL learners benefit from being explicitly shown the similarities and differences between the L1 system and the L2 system. Cognates are one of these commonalities between languages.

While explicit cognate instruction can already be helpful for TD EFL learners (Helman, 2014; Dressler et al., 2011), it might be that children with DLD benefit from this approach even more, as these children have an enhanced declarative memory, and benefit from explicit instruction. Grasso, Peña, Bedore, Hixon & Griffin (2018) have found that Spanish – English bilinguals both with and without DLD, identify cognates more often than non-cognates. This would suggest that when someone knows the name of an item in the L1, and that word has a cognate in the L2, they will be more likely to know the translation in the L2 than if the word in the L1 would not have a cognate in the L2. Due to these results, Grasso et al. (2018) recommend using cognates in intervention programmes for bilingual students diagnosed with DLD (p. 629), as these students have smaller vocabularies than their TD

peers, but benefit from cognate strategy just as much. *CodeTaal* includes cognates in the first part of the lesson, introducing new words each week, and explicitly discussing the similarities between the word in Dutch and the word in English.

Blom & Paradis (2015) have found positive transfer from L1 to L2 in TD children in the domain of tense inflection. This transfer, however, only occurred after the participants had reached a certain threshold needed for successful transfer (p. 971). The threshold lays at 15 months of exposure to English, because to successfully transfer from a L1 to a L2, some knowledge has to have been obtained in the L2, otherwise there is nothing to transfer to. Some literature on cross-linguistic transfer has found that the process of cross-linguistic transfer works differently in children with DLD. While finding positive transfer for morphological inflection in typically developing children, Blom & Paradis (2015), have found that children diagnosed with DLD have difficulties noticing similarities between their mother tongue and second language. This study looks at the typological similarities between the L1 and L2 (English) of the participants, and investigates if this has an influence on the correct placement of tense inflections of the third person singular and regular past tense. It has been found that children with a L1 which has a rich inflectional system more often correctly use tense inflections than children who have an L1 which does not contain verb inflections. This effect is found for the entire group of TD and DLD children combined, but by carrying out a classification analysis it has been found that this effect was mainly due to the TD group. They therefore conclude that children with DLD use their L1 as less of a resource than TD children, and TD children are therefore better able to transfer their L1 knowledge.

What makes transfer even more difficult for children with DLD is a limited amount of input. Participants in the study by Blom & Paradis (2015) were acquiring their L2 with quite a lot of exposure, but this is not always the case. A study by Verhoeven, Steenge & van Balkom (2012), has found a case of positive transfer in bilingual Turkish (L1) – Dutch (L2) children

with DLD. However, alongside these findings they state that bilingual children will always be faced with the “additional disadvantage” (p. 182) of receiving less exposure than required for successful transfer between a L1 and a L2. This problem becomes more serious in the context of learning EFL. Exposure to English is often minimal in instructional settings; participants in the *CodeTaal* study received only one 45-minute lesson per week, which can be argued to not be adequate enough to support children in their use of cross-linguistic transfer. A study by Zoutenbier & Zwitserlood (2019), that focuses on EFL, rather than English as a Second Language (ESL), has found a positive correlation between word decoding skills in Dutch (L1) and written vocabulary in English (L2). However, the positive correlation was one of the few L1-L2 correlations they have found. This is in contrast to literature on cross-language relationships in TD FL learners which often finds more L1-L2 correlations. One example is a study by Commissaire, Duncan & Casalis (2011). They have investigated orthographic processing skills in French-speaking children who were learning English at school. Evidence has been found for positive transfer of lexical orthographic skills. Where children have well developed lexical orthographic skills in French they often exhibit strong lexical orthographic skills in English.

Due to a lack of a control group and the use of standardized tests developed for TD children in the study by Zoutenbier & Zwitserlood (2019), it cannot be concluded that children with DLD reveal less L1 – L2 correlations than TD children. Similarly, Tribushinina, Dubinkina & Rabkina (2019) have investigated this topic, but included a control group and used tests that would not put the participants with DLD at a disadvantage. They have found that children with DLD show positive transfer regarding vocabulary, while matched TD children exhibit positive transfer in the domains of vocabulary and grammar. They link these findings to two possible explanations, a “weak L1 knowledge” (p. 26) or as discussed above “damaged transfer mechanisms” (p. 26). If reduced transfer is due to weak L1 knowledge, as

proposed by Ebert, Kohnert, Pham, Disher & Payesteh (2014), it could be suggested that interventions should not only focus on the acquisition of a L2, but also on strengthening the L1 knowledge. If reduced transfer is due to transfer mechanisms affected by the disorder (Blom & Paradis, 2015), a damaged transfer system cannot be repaired, but children can be taught how to manage their impairment, by showing them differences and similarities between their L1 and the L2 they are acquiring. In light of these results the *CodeTaal* intervention seeks to support the L1 knowledge of the participants as well as facilitating the explicit comparison between languages to assist the cross-linguistic transfer.

3. The Present Study

The *CodeTaal* intervention is based on principles proposed in a study by Tribushinina et al. (2019). They call for the need of supporting children's cross-linguistic transfer system (p. 27), and providing explicit FL instruction. This conceptual idea has been translated into the *CodeTaal* intervention by Niemann (2020). She created lesson plans, in which the cross-linguistic transfer plays a major role. These lessons were then introduced by Niemann in classes in the intervention school. Lahdo (2020) has tested the effectiveness of the intervention by comparing the results of a Grammatical Judgement Task (GJT), Receptive Vocabulary Task (RVT) and Translation Task, between the intervention and control group. There were no significant differences between the groups at pretest. During the intervention, the performance of the intervention group on the RVT and the GJT significantly improved, whereas no significant improvement was found in the control group. While administering the pretests the research team encountered a problem with the GJT. The GJT was found to be too difficult for the participants. It was proposed that the test might have been too difficult because it requires children to tap into their metalinguistic knowledge, and it was therefore decided to introduce a new grammar test at posttest. The performance of the intervention group and the control group on this test has not been analysed yet. This is what this thesis

aims to do. Alongside this, the thesis will also be investigating the treatment fidelity and the suitability of the intervention for different kinds of learners. For these two questions data from the second cohort will be used. This group started receiving the intervention lessons after the posttests. These lessons were taught by the author of this thesis and an MA-student, who is also enrolled in the research project.

4. Research Questions & Hypotheses

RQ1: Does the intervention group outperform the control group on the grammar test post-intervention?

Following previous research that studied the benefits of interventions using explicit and visual instruction (Ebbels, 2007; Ebbels et al., 2014, Zwisserlood et al., 2015) it is expected that the intervention group will outperform the control group on the grammar test.

RQ2: For what kind of learners is the *CodeTaal* intervention suitable?

It is expected that the intervention will work well for certain kinds of learners. The intervention triggers cross-linguistic transfer, but to adequately use transfer, a certain amount of L1 knowledge is needed. It is therefore expected that children with a good grasp of Dutch grammar, will perform better in the intervention. English proficiency could also play a role, although it is not clear what the effects of this will be. On the one hand it could be expected that children who have a good English proficiency will experience the intervention as boring, but on the other hand it is also possible that the participants need a certain degree of English proficiency to adequately participate in the intervention and to reveal benefits of transfer (Blom & Paradis, 2015). A last principle that will be investigated is the suitability of the intervention for hearing-impaired children. Cluster 2 schools, which the participating schools are, teach both children with DLD and children with a hearing-impairment. The intervention was initially created for Dutch children with DLD, but might also be beneficial for children with a hearing-impairment.

RQ3: How is the *CodeTaal* intervention implemented in an EFL classroom?

Changes made to the intervention are expected, as it was initially created for one-to-one therapy (Niemann, 2020), but will be implemented in a classroom.

5 Study 1: Development of EFL Proficiency

5.1 Methodology

5.1.1 Participants

In this study 68 school-aged children participated. Each participant was enrolled in one of the two special education primary schools. Within the group of participants, there were 16 females, 19 bilinguals and 5 children with a hearing-impairment. The ages ranged from 107 to 157 months ($M = 132.12$, $SD = 12.80$). The participants were divided into an intervention ($n = 38$) and a control group ($n = 30$). In Table 1, the information about the participants is divided into separate grades.

Table 1.

Participant information.

Group	Grade (n = number of students)	Mean age (in months)	Age range (in months)	Number of females	Number of bilinguals	Number of hearing-impaired
Control	4 (12)	121.92 ($SD = 7.70$)	109 - 135	4	6	1
Control	5 (6)	136.00 ($SD = 7.59$)	124 - 145	2	1	0
Control	6 (12)	144.25 ($SD = 6.20$)	135 - 157	2	2	2
Intervention	4 (14)	118.93 ($SD = 10.56$)	107 - 146	3	8	1

Intervention	5 (14)	131.79 (<i>SD</i> = 4.81)	123 - 141	4	2	1
Intervention	6 (10)	146.40 (<i>SD</i> = 5.66)	137 - 155	1	0	0

5.1.2 Materials

The participants completed a Grammar Test (Appendix A). This test was a multiple-choice test consisting of 30 sentences which contained a gap. Participants were supplied with four possible answers, and were asked to choose the correct grammatical form that fitted the gap in the sentence. A total of 30 points could be attained, as each correct answer yielded one point. The test aimed to assign a score to the participants that described their grammatical knowledge of English. The test therefore contained different grammatical categories. Some of these categories were discussed in the intervention lessons, such as the present simple, articles, plural forms and personal pronouns. Other categories such as past tenses or the present continuous were not present in any of the intervention lessons. The test included 18 treated items and 12 untreated items.

5.1.3 Procedure

Testing

The grammar-test was conducted four months after the pretest, on which the groups were found to perform similar (Lahdo, 2020). The grammar tests were supplied to the teachers of each class in the control and intervention group, and were administered in the classrooms by the teachers themselves.

Intervention

Time-on-task was similar for both groups of participants. The participants of the control group received English lessons using the methodology Groove Me (Blink, 2020), in which lessons are formed around a pop song. These lessons had a strong focus on vocabulary, grammar and practicing dialogues. The intervention lasted around 12 weeks, with one 45

minute lesson each week, taught by an UU-student under supervision of an ambulant tutor from the Koninklijke Kentalis. Each lesson was separated into two parts. The first part had a focus on cognates. Each week new words would be introduced to the participants. These words would be represented by a drawing or a colour if the new word was a colour (Figure 1). Certain words would be cognates others were non-cognates. In the example of Figure 1, both words are non-cognates; ‘to carry’ translates to *dragen*, and ‘pink’ translates to *roze*. The teacher would introduce the new word by saying the word aloud in English as well as supplying the written form. The participants would then provide the Dutch translation, after which the teacher would question the participants on if the words in Dutch and English were a cognate pair. In the communication to the participants the word cognate was not used, as this might have been too difficult, instead they were asked if the words were siblings; *broertjes* or *niet-broertjes* in Dutch. This was often followed by a short discussion on why the words were cognates (siblings) or not.



Figure 1. Images used in the CodeTaal intervention representing the words ‘to carry’ and ‘pink’.

The second part of the lesson concerned syntax and revolved around constructing sentences in Dutch and English. Students were supplied with a black and white piece of velcro tape and a box containing colour-coded shapes, which corresponded to grammatical particles. For example, a yellow circle corresponded to a full verb, and articles were represented by grey rectangles. Alongside these materials the students also received a sheet containing all codes (Appendix B). Sentences were displayed on a digital board, and the

participants had to construct these sentences using the colour-coded shapes. Each sentence was constructed once in Dutch on the white velcro, and once in English on the black velcro, an example from the first lesson can be seen in Figure 2. After the participants had finished constructing their sentences, the correct form would be displayed on the digital board. Hereafter, the differences and similarities between the Dutch and English sentence were explicitly discussed, to facilitate cross-language awareness. New sentences and grammatical categories were introduced each week. Previously discussed items were also repeated to stimulate the learning process.

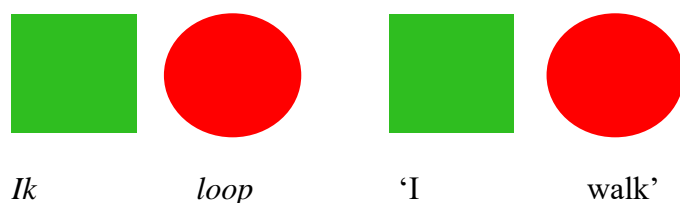


Figure 2. CodeTaal representation in Dutch and English of the sentence 'I walk'.

5.1.4 Analysis

The grammar test was scored by another member of the research project. The data from this test was analysed using SPSS. An independent samples t-test was used to investigate if the intervention group outperforms the control group on the grammar test. Another independent samples t-test was performed, to investigate if either group performed better on the treated items, this test therefore included only the scores calculated with the treated items. An ANOVA was also performed to uncover possible differences between class and age.

5.2 Results

The mean grammar scores for the control group and intervention group are presented in Table 2. The mean score is slightly higher for the control group, but an independent samples t-test showed that the groups did not differ significantly ($t(66) = 0.53, p = .60$).

Table 2.

Mean scores (and standard deviations) of the grammar test split by group (n = number of observations).

	Control group (n = 30)	Intervention group (n = 38)
Mean	13.50 (5.34)	12.79 (5.67)

In Table 3 the mean grammar scores are presented, but in this instance they only include the treated items. Similarly to the scores presented in table 2 the mean scores are slightly higher for the control group, but an independent samples t-test showed that the groups did not differ significantly ($t(66) = 0.17, p = .86$).

Table 3.

Mean scores (and standard deviations) of the grammar test only including treated items split by group (n= number of observations).

	Control group (n=30)	Intervention group (n=38)
Mean	8.2 (3.35)	8.05 (3.63)

In Table 4 the mean grammar scores are split between the different grades. A More-Way Anova was used to analyse difference between the grades. No main effects for grade ($F(2, 62) = 1.07, p = .35$) or group ($F(1, 62) = 0.47, p = .49$) were found. An interaction effect between group and grade was also not found ($F(2, 66) = 0.17, p = .84$).

Table 4.

Mean scores (and standard deviations) of the grammar test split into groups and grades (n = number of observations).

	Control			Intervention		
	4 (n= 12)	5 (n= 6)	6 (n = 12)	4 (n = 14)	5 (n = 14)	6 (n = 10)
Mean	12.17 (4.06)	15.50 (7.26)	13.83 (5.52)	11.79 (5.29)	13.29 (6.38)	13.50 (5.52)

5.3 Discussion

This first study investigated the effectiveness of the intervention. It was expected that the intervention group would outperform the control group on the grammar test as research on similar interventions (Ebbels, 2007; Ebbels et al., 2014, Zwitserlood et al., 2015) has shown benefits of explicit and visual grammar instruction for children with DLD. It has been found that the intervention group did not outperform the control group, also when only the treated items were included, and no effects of class and age were found. The hypothesis is therefore not supported. These results would suggest that the intervention does not prove to be beneficial for enhancing grammar knowledge in children with DLD. Interventions with visual and explicit instruction might only be useful for L1 acquisition such as *MetaTaal* (Zwitserlood et al., 2015) and *Shape Coding* (Ebbels, 2007) have proved to be, but *CodeTaal* fails to produce similar results for Dutch children with DLD learning EFL. However, this statement is not made without reservations. Lahdo (2020) also investigated the effectiveness of *CodeTaal*, and has found positive results on the Grammaticality Judgement Task and a Receptive Vocabulary Task. This might suggest that the grammar test does not necessarily reflect the knowledge obtained in the intervention, or that the grammatical categories that

were discussed in the lesson were not discussed as explicitly as they should have been discussed. This argument is supported by the finding that the participants also did not improve when just the treated items were taken into account. This would mean that the grammar rules should be explained more explicitly. Another explanation might be that the duration of the intervention was too short to reveal effects. This would suggest that a more long-term intervention might show more positive results. Future research is needed to understand the reason why the intervention did not prove to be beneficial for students with DLD when looking at results from the grammar test but did prove to be beneficial according to results from the GJT and RVT. When an explanation has been found, it can then be decided if future implementations of the intervention need, for example, even more explicit instructions.

6. Study 2: Suitability of the Intervention for Different Learner Types

6.1 Methodology

6.1.1 Participants

In this study 12 students with DLD participated, they were enrolled in a 6th grade class in a special education primary school, which previously acted as the control group. The participants' age ranged from 135 to 157 months, with a mean age of 144.25 months ($SD = 6.20$), and the group included 2 girls, 2 hearing-impaired participants and 2 bilinguals.

6.1.2 Instruments

To assess what kind of learners the intervention suited, a participation score (Appendix C) was given to each student. The score was related to their proficiency in Dutch and English. English proficiency was measured using a Grammaticality Judgement Task (Appendix D), Receptive Vocabulary Task (Appendix E) and the Grammar Test (Appendix A). For the Dutch proficiency, scores from the Sentence Repetition Task (Appendix F) and Peabody Picture Vocabulary Task were used.

Participation Score

The participation score aimed to represent how well the participants were able to participate in the intervention. It was divided into an emotional score and a cognitive score. The emotional score represented how motivated or happy the participant was to participate in the intervention, while the cognitive score represented how well the participant was able to cope with the intervention. Each score was calculated by using a Likert-scale ranging from 0 to 10, where 10 meant that the participant was extremely motivated or could cope with the intervention very well.

English Tests

Grammaticality Judgment Test (GJT)

The GJT contained 54 sentences, of which 27 were grammatical and 27 ungrammatical. Twelve of the grammatical sentences were explicitly treated in the intervention. A total of 24 sentences were not explicitly treated but did contain treated grammatical categories. The remaining sentences were neither treated nor contained familiar structures. At the start of the test, 3 practice sentences were shown to the participants. Of these three sentences only one was grammatical, which allowed the researchers to explain the first two ungrammatical sentences to the participants, which helped the participants with understanding the test. The sentences were displayed on a PowerPoint with a teddy bear pronouncing the sentences in a British-English accent, the audio was only played once. The participants were asked to judge the sentences on their grammaticality. When participants judged a sentence as incorrect they were asked to explain why they thought the sentence was grammatically incorrect.

Participants were awarded a point if they answered correctly and if they identified the ungrammaticality in an ungrammatical sentence, but were not able to correctly change the error. No points were granted when participants answered incorrectly or were unable to identify the error in an ungrammatical sentence. Participants could receive a total of 54 points.

Receptive Vocabulary Test (RVT)

The RVT contained 40 word-image pairs. Twenty words were cognates in Dutch and English, the remaining 20 were not cognates. Ten word pairs of each group were treated in the *CodeTaal* intervention lessons. Participants were shown a PowerPoint which contained two practice trials and the 40 items which were tested. On each slide four pictures were shown and a word in English is pronounced with a British-English accent. The participants were asked to choose the corresponding picture out of the four shown on the slide. They answered by either pointing to the correct picture or saying the corresponding number. There were no time-constraints placed on the test, but the audio was only played once. Choosing the correct picture yielded one point, 40 points being the perfect score.

Dutch Tests

Sentence Repetition Task (SRT)

The LITMUS SRT developed within the European COST Action IS0804 (2001) (Marinis & Armon-Lotem, 2015) consisted of 30 Dutch sentences, excluding 2 practice sentences. The sentences were spoken aloud by a teddy bear which was shown on a PowerPoint. The test was created so that the participants had to follow a teddy bear who was going on a treasure hunt, but they could only follow the teddy bear, by repeating the sentences he spoke. It was allowed to repeat the recording once after the initial playing. Participants who imitated the sentence perfectly received a score of 1, if the participants made one or more mistakes they received zero points. The total number of points a participant could receive was 30. The SRT has been found to be a good measure of overall language proficiency because to correctly repeat a sentence the participant has to tap into different language skills, starting with listening and comprehension ending up at the production of the sentence (Marinis & Armon-Lotem, 2015). The sentences used in the SRT were too long to be parroted and had to be processed through the grammatical system, which could mean that if a participant was unable to repeat the sentence they had not yet acquired the necessary grammatical categories.

Peabody Picture Vocabulary Test (PPVT)

The PPVT – III – NL (Schlichting, 2015) is a standardized receptive vocabulary test, similar to the RVT. The participants had to choose a picture, out of four shown, that corresponded to the word that they heard. The difference was that the words were pronounced in Dutch, and the PPVT did not contain 40 words, but rather had a system of different levels corresponding to the ages of the participants. The *woordbegripsquotiënt* (WBQ; ‘word comprehension quotient’) was calculated by using the standardized scores from the PPVT.

6.1.3 Procedure

After the four intervention sessions in the second cohort, which were roughly the same as the intervention offered to the first cohort as described above, participation scores were given by the two students who taught the intervention. The teacher himself also gave each participant a score. The RVT, GJT and SRT were administered by members of the research project, including the author of this thesis, during school days. The scores were taken from the second time these participants performed the tests. It was decided to use these scores, as they best reflected the current proficiency of the participants, seeing as the tests were administered a couple of weeks before the intervention started. Participants were tested individually in a quiet room in the school. Alongside these tests, two other tests were also administered, and to not tire out the participants it was made sure that they did not complete more than three tests at a time. Participants were allowed to take breaks whenever they felt like they needed one. The order of the tests was randomised, and the sessions with the GJT and SRT were audio-recorded. The PPVT was administered by speech-therapists from the Koninklijke Kentalis, the scores including the WBQ were supplied by these speech-therapists to the research team. The WBQ scores came from tests administered in 2019, but for one participant no score was supplied in 2019, and for another participant this score was ambiguous, thus it was decided, for these two participants, to work with their WBQ scores from 2018.

6.1.4 Analysis

The proficiency tests were scored by another member of the research project, leading to three scores of English proficiency; GJT, RVT and the Grammar Test, and two scores of Dutch proficiency; SRT and the WBQ. Firstly, the three different participation scores for each participant were analysed for interrater reliability using Cronbach's Alpha. SPSS was used to uncover possible correlations between the participation score and proficiency scores, calculating the Pearson's correlation. Lastly the suitability of the intervention for participants with a hearing-impairment opposed to participants with DLD, was analysed using a qualitative comparison between the two groups.

6.2 Results

The mean scores of the language tests are presented in Table 5. Following the results from a reliability analysis, it was decided to group together the emotional participation scores ($\alpha = .79$). It was decided for the cognitive scores to group the first two scores which together had an adequate interrater-reliability ($\alpha = .67$). The third score was used separately. The mean participation scores are presented in Table 6.

Table 5.

The mean scores (and standard deviations) for the four language tests (n = number of observations).

	RVT (n = 12)	GJT (n = 12)	SRT (n = 12)	PPVT (n = 12)	Grammar Test (n = 12)
Mean	36.08 (3.45)	24.42 (4.72)	14.17 (6.94)	86.67 (8.27)	13.83 (5.52)

Table 6.

Mean scores (and standard deviations) of the participation scores split into emotional and cognitive scores (n = number of observations).

	Emo_Score (n = 12)	Cog_Score 1 & 2 (n = 12)	Cog_Score 3 (n = 10)
Mean	6.72 (0.74)	7.08 (0.56)	7.5 (0.71)

As can be seen in Table 7, there was a significant positive correlation between the SRT score and the cognitive participation score 1 & 2 ($r = .65, p = .02$) and between the grammar test and the cognitive participation score 3 ($r = -0.71, p = .02$). No other significant correlations were found.

Table 7.

Pearson's correlation (and p-values) of the language tests and participation scores.

		RVT	GJT	Grammar Test	SRT	PPVT
Emotional score	Pearson's r	-0.48	0.20	-0.26	0.26	-0.06
	p-value	.12	.53	.42	.42	.86
Cognitive score 1 & 2	Pearson's r	0.09	0.23	0.27	0.65*	0.15
	p-value	.78	.48	.40	.02	.65
Cognitive score 3	Pearson's r	-0.22	-0.38	-0.71*	-0.48	-0.44
	p-value	.54	.28	.02	.16	.21

*Note. Correlations marked with * were found to be significant.*

The mean participation scores for the hearing-impaired and non-hearing-impaired participants are presented in Table 8. The mean scores for the emotional score and cognitive score 1 & 2 were slightly higher for the hearing-impaired participants, while the non-hearing-impaired participants had a slightly higher cognitive score 3. The scores between hearing-impaired and non-hearing-impaired did not differ hugely, combined with the observations that the hearing-impaired participants did not need extra help, and seemed to participate just as easily as the other participants.

Table 8.

Mean participation scores split into non hearing-impaired and hearing-impaired participants (n = number of observations).

	Emotional Score	Cognitive Score 1 & 2	Cognitive Score 3
Non-hearing-impaired (n = 10)	6.7	6.55	7.1
Hearing-impaired (n = 2)	6.83	7	7

6.3 Discussion

The question this study aimed to answer is: For what kind of learners is the *CodeTaal* intervention suitable? The suitability has been investigated on three different levels and each part will be discussed separately.

The first part focusses on Dutch proficiency, and it was expected that participants with a higher proficiency in Dutch performed better in the intervention. Analyses of correlations between Dutch proficiency tests and the participations scores shows a significant positive

correlation between the SRT scores and the combined cognitive participation score of scorers 1 and 2. This shows that participants with a high proficiency in Dutch cope well with the intervention. The activation of knowledge of Dutch is a manifestation of transfer. This supports the hypothesis, and is in line with literature stating that before transfer mechanisms can work an adequate amount of L1 knowledge needs to have been obtained (Cummins, 1979).

The second part investigated is the English proficiency of the participants. It was expected that either students with a high proficiency will be bored by the intervention or that students need a high proficiency to adequately cope with the intervention. The analyses yielded no significant correlations between the English proficiency scores and the motivational participation scores. The first part of the hypothesis is therefore not supported. In regards to the second part, a significant negative correlation between the grammar test and the cognitive participation scores of scorer 3 has been found. This suggests that when a participant has a low score on the grammar test, and therefore a low English proficiency, they coped quite well with the intervention. The opposite also holds true, as participants who have a good English proficiency do not cope well with the intervention. This is not in line with the hypothesis. These results were however only found when using the cognitive score from scorer 3, which differed from the scores from scorer 1 and 2. No such correlation has been found between the SRT and the other cognitive score.

The third and last part focusses on the suitability of the intervention for participants with a hearing-impairment. There is no literature that would suggest that an intervention which uses visual and explicit instruction to support the EFL acquisition for children with DLD would not be beneficial for students with a hearing-impairment. The qualitative comparison between the average participation scores does not show evidence of the intervention not being suitable for children with a hearing-impairment. This is supported by

the observation during the lessons that participants with a hearing-impairment did not necessarily need more help or required more time to understand the intervention. These results support the hypothesis, that *CodeTaal* is a suitable for this group of participants. Future implementation of the intervention should therefore include hearing-impaired children wherever the need arises.

Generally speaking the participants did cope well with the intervention lessons. Some participants required some extra help, especially with the explanation of the codes, but no major problems occurred. These findings are also reflected in the cognitive scores (Table 6), which are quite high. The participants also quite liked working with the intervention, although motivation sometimes caused some problems. Some participants found the stimuli included in the lessons too easy, which led to boredom. On a few occasions some participants did not seem to enjoy the lesson if they ran into certain difficulties with constructing sentences. Disliking the intervention was however a short-term problem, and did not occur during every lesson. The slightly lower emotional score (Table 6) supports this personal experience as a teacher of the intervention.

An implication specific of this study is that the participation scores were supplied a few weeks after the intervention had abruptly ended. These scores might therefore not represent the truth entirely. This needs to be considered when using the results of this study for future research or implementation of the intervention.

7. Study 3: Treatment Fidelity

7.1 Methodology

7.1.1 Tasks

To answer the third research question, a semi-structured interview (Appendix G) was conducted with the teacher of the 6th grade class that received the intervention. The interview was divided into two parts. The first part aimed to get an overview of the teaching methods

used prior to the intervention. The second part of the interview focused on the opinion of the teacher on the intervention itself. The interview was conducted and recorded via Microsoft Teams, with verbal consent of the teacher. The recording was transcribed afterwards (Appendix H). Alongside the answers to the interview questions, lesson observation notes were used to analyse the treatment fidelity. These procedural notes were written down during and after the four intervention lessons. They included information about how children reacted to the intervention and which changes were made to the intervention lessons.

7.1.2 Procedure

The answers and notes yielded qualitative data and could not be subjected to statistical analysis, they were therefore analysed using thematic analysis (Braun & Clark, 2012). Firstly any interesting meaningful segments were coded. These codes were then grouped together in broader themes, which were used to report the treatment fidelity.

7.2 Results

The analysis of the interview and procedural notes yielded three different themes. Each theme is discussed separately.

Learning Ability

One of the biggest issues that needs to be considered before implementing the intervention is the learning ability of the students undergoing the intervention. It was noted by the teacher that for students who are going to a higher level of secondary education, the intervention lessons were too easy, this is presented in the quote from the interview: “I noticed that the intervention went too slow for a couple of students who will attend *vmbo-t / havo*, they understood it at a faster pace.” This also something which has been written down in the procedural notes, and ties in with issues on the subject of motivation. It was discovered after the first lessons that the participants became quite bored after a few similar sentence structures had been discussed. Especially the children who had a better learning ability,

understood how sentences worked after the same form had been discussed twice. This meant that if a similar form was discussed a third or fourth time the participants did not pay good attention anymore, and had often lost interest when it came to comparing the Dutch and English sentences. The same motivational problems also emerged while playing the cognate game, the items used in the intervention were too easy, which led the participants to not really think about if something is a cognate or not, which is the main point about this part in the intervention. In one lesson, a different approach to the cognate game was taken, children were grouped together and had to discuss why the words they were given were cognates or not, and afterwards they had to explain to the rest of the group why their words were cognates or not. This led to positive response from the group, and it also seemed like, because of the interactive, student-centered first part of the lesson, the students were more focused during the second part.

Time

Before the intervention can be implemented alongside an existing method, such as *Groove Me* (Blink, 2020) which was used in the school, each student has to have mastered the *CodeTaal* method. It could be argued that *CodeTaal* itself could be used as the sole method to teach English, but it might also be beneficial to combine it with another method in which, for example, dialogues are practiced, as this is not an area that is included within the *CodeTaal* intervention. The teacher did not believe there was enough time to implement the *CodeTaal* method combined with another method. At least not right now with the current available time for English education. “ I believe that two schoolyears are too short [.. to implement the intervention]. Especially if there are only 45 minutes a week. That would mean that the frequency of English needs to increase.” Another timing issue was that the lessons as they were initially created and planned out were too long. They contained too many sentences to correctly and accurately discuss the differences and similarities between the Dutch and

English sentences, which is quite an important part of the intervention. After the first three lessons it was decided to limit the number of sentences to three Dutch-English pairs, but this in turn proved to not be enough sentences. It was found that the planning of the intervention takes trial and error, and is also something which needs to be considered combined with the learning-ability of the students regarded.

MetaTaal

In the school which was subjected to this study, *MetaTaal* (Zwitsersloot et al., 2015) had already been an implemented method for Dutch acquisition. It was mainly used in individual sessions with the speech-therapists, but the teacher was also working together with a speech-therapist of the school to implement the intervention in a classroom setting. The teacher noticed the similarities between *MetaTaal* and *CodeTaal*, and how he had already noticed the benefits from *MetaTaal* and saw similar benefits in *CodeTaal*. The teacher wondered if there was a possibility to combine the two methods, as the memory-load might become too big if both methods are introduced in a classroom setting.

Additional remark

After the fourth lessons, both intervention teachers felt like they knew the general learning ability of the class, and had decided on a different approach, using songs as a base from which sentences and vocabulary would be taken used for the cognate game and code part. When this was proposed to the class, it seemed to lead to positive feedback, but due to the Covid-19 outbreak it was not attempted.

7.3 Discussion

This study aims to investigate the treatment fidelity of the intervention in a classroom setting. It was expected that certain changes needed to be made, but it was not clear what those changes would be. With the help of observation notes and an interview with the teacher of the class receiving the intervention, it has been found that there are three major themes that need

to be considered before implementing the intervention in a new school or classroom. These themes are learning ability, time and *MetaTaal*.

In regards to the learning ability, before implementing *CodeTaal* in a new school or classroom, an intensive discussion needs to take place with the concerned teacher, speech-therapists and intervention teacher(s). The general learning ability of the students should be investigated, and the intervention needs to be adapted to the certain level and needs of these students. As with any classroom intervention, it is difficult to cater for each individual student. In the case of this cohort, if before the intervention the learning ability of the students had been discussed, the intervention might have run a bit smoother. It would have been known which words to include or exclude from the cognate game, and not so many sentences of the same structure would have been discussed. Which would ultimately have led to less protest from the students.

What needs to be considered regarding timing issues, is how the teaching team wants the intervention implemented. Do they solely want to have *CodeTaal* as their teaching method, or do they want to work with *CodeTaal* next to an existing method (such as *Groove Me*, which was used in the second cohort). They might choose to combine it with individual exercises in which, for example, dialogues can be practiced.

The last major point that has been found through the analyses is the comparison between *MetaTaal* en *CodeTaal*. *MetaTaal* (Zwitsers et al., 2015) has been implemented in the school and most students already have experience with this method which is quite similar to *CodeTaal*, as it uses explicit instruction combined with visual support to support the language acquisition of children with DLD. It cannot be expected that every school works with *MetaTaal*, but it would be useful to investigate if the relevant school has experience with a similar intervention to *CodeTaal*. It could be expected that working with two different, but similar in form, methods might lead to a memory load which is too big for the children to

bear. This would not work in favor of the intervention, and looking into combining methods or using a single method for both languages should definitely be something to consider before implementing the intervention.

8. General Discussion

This thesis aimed to investigate the effectiveness, suitability and treatment's fidelity of the *CodeTaal* intervention. Previous research has shown that interventions with explicit instruction and support in cross-language transfer help children with DLD with acquiring languages (Ebbels et al., 2014; Zwisserlood et al., 2015). In this thesis it is found that the effectiveness of the *CodeTaal* intervention cannot be supported by the results, but this does not mean that the entire intervention is not useful for children with DLD learning EFL, as it has been noted before that Lahdo (2020) did find significant positive results that support the benefits of the intervention. It has also been found that children with a high Dutch proficiency will cope better within the intervention. These results support the Developmental Interdependence Hypothesis (Cummins, 1979). A good Dutch proficiency is needed before participants are able to cope well with the intervention. This finding also suggests that children with DLD need to acquire a certain threshold of L1 proficiency before transfer start to be successful, just as has been found for TD children (Blom & Paradis, 2015). Further research is needed to understand in which specific areas this transfer occurs and at what the specific threshold for children with DLD is. A high English proficiency negatively correlates with the ability to cope with the intervention. Hearing-impaired children are no less suitable to undergo the intervention, and will have as many benefits as non-hearing-impaired children do. The last study shows that three major themes, learning ability, time and *MetaTaal*, need to be considered when implementing this intervention.

The initial planning included 12 to 15 weeks of intervention lessons, but this turned out to be only 4 lessons, including an introductory lesson, because of the outbreak of Covid-

19. Studies two and three in this thesis are therefore based on observations obtained from only three intervention sessions. It can be argued that three 45-minute lessons are not enough for the children to understand and cope well with the intervention, and the participation scores might therefore not fully and truthfully represent the participation as it would have been after the entire intervention had been implemented.

Each separate study found some things to consider before implementing the intervention in new school or classrooms. Regarding the first study it might be useful to discuss grammar rules more explicitly. This instruction could be included within *CodeTaal* or the teaching team could decide to use another English method alongside the intervention. It should be made sure that this other method includes explicit grammar instruction, and possibly using similar exercises as the grammar test used in Study 1.

It has also been found that children with a high proficiency in Dutch cope better with the intervention. This would suggest that it would be helpful to ensure that all students have an adequate proficiency of Dutch before participating in the intervention. This could be done by using the *CodeTaal* intervention in Dutch lessons, as this might not only strengthen their Dutch but also help students grasp the idea of the intervention before they it is implemented in EFL lessons. Before this is decided to do, future research is needed to investigate the benefits of *CodeTaal* for acquiring Dutch grammar. If this research shows these benefits, and *CodeTaal* is implemented in Dutch lesson it would also help with the timing issue found in the third study. The intervention will already have been implemented, so the limited time is not necessarily a problem anymore. *CodeTaal* could then, if wanted by the teaching team, be implemented alongside another method that includes other areas necessary to acquire English, such as speaking or writing. If *CodeTaal* is found to not be beneficial for acquiring Dutch grammar, the similarities and differences between *MetaTaal* and *CodeTaal* could be investigated, as this is also something the teacher noticed. It could be decided to use *MetaTaal*

for both Dutch and English, or a combination of the two methods could be investigated. A new intervention that would both target Dutch and EFL acquisition could be created, which would limit the possible problems with memory overload.

Even though this study did not necessarily show benefits of the intervention for EFL acquisition, Lahdo's (2020) research did. More research is needed to investigate the effectiveness of the study. This thesis has however shown that a good Dutch proficiency helps with coping with the intervention and hopes to have given an overview of certain issues that need to be considered and investigated before implementing *CodeTaal* in other schools and classrooms.

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Appendix A – Grammar Test

- 1 Tomasz _____ from Poland.
a) are b) is c) are not d) am
- 2 Maria and Fernando _____ Spanish.
a) is b) is not c) are d) am
- 3 My mum is talking to three _____ .
a) woman's b) woman c) women d) womans
- 4 There is _____ pencil on the table.
a) a b) two c) some d) long
- 5 My brother is sixteen. _____ called Tom.
a) She is b) He is c) It is d) You are
- 6 I have two sisters. _____ bedroom is very big.
a) His b) Three c) Their d) Her
- 7 _____ are you from?
a) Where b) What c) When d) Who
- 8 I read many _____ .
a) book b) a book c) the book d) books
- 9 _____ are twenty students in my class.
a) Do b) There c) I d) It
- 10 I have many _____ in my room.
a) nice toy b) nice toys c) toy nice d) toys nice
- 11 Federico _____ Italian.
a) were b) is c) am d) are
- 12 _____ you got any apples?
a) Has b) Have c) Is d) Do
- 13 They speak English but they _____ speak French.
a) do not b) do c) does d) does not
- 14 _____ he play the guitar?
a) Do b) Does c) Is d) Don't
- 15 I _____ at 7 o'clock.
a) always get up b) get always up c) get up always d) up get always
- 16 I like him but he does not like _____ .
a) we b) he c) they d) me
- 17 She _____ a black T-shirt today.
a) wears b) wear c) is wearing d) are wearing
- 18 My friend, Jack, _____ ill yesterday.

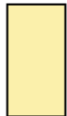
- a) is not b) was c) were d) were not
- 19** We _____ a picnic in the park yesterday.
a) have b) has c) had d) having
- 20** My sister often _____ the piano.
a) play b) playing c) plays d) is playing
- 21** I _____ to bed at 10 o'clock.
a) go normally b) go sometimes c) normally go d) go never
- 22** She _____ to school yesterday.
a) walked b) walks c) walk d) walking
- 23** We usually go to the disco on Saturdays but we _____ today.
a) do not go b) does not go c) is not going d) are not going
- 24** There is _____ book on the table.
a) five b) some c) a d) thick
- 25** My sister is fifteen. _____ called Ana.
a) She is b) She are c) He is d) He are
- 26** I _____ to London last week.
a) go b) was c) went d) am not going
- 27** The girl _____ a black cat.
a) am b) are c) have d) has
- 28** I _____ 10 years old.
a) is b) isn't c) are d) am
- 29** The pilots fly _____ blue airplanes.
a) in the b) on the c) in a d) on a
- 30** We _____ English books.
a) always reads b) reads always c) always read d) read always

Appendix B – CodeTaal sheet

Functiewoorden



Lidwoord (de/het/een)



Voorzetsel (bijvoorbeeld: op/in)

Naamwoorden



Persoonlijk voornaamwoord (ik, jij, hij/zij, wij, jullie, zij)



Bijvoeglijk naamwoord (bijvoorbeeld: groene, lange, korte)



Bijwoord (bijvoorbeeld: altijd, vaak, soms)



Zelfstandig naamwoord (mens, dier, ding; bijvoorbeeld: man, muis, boek)

Meervoud



-s



-en

Werkwoorden



Stam (bijv. loop, dans, rijd)



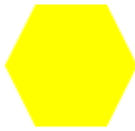
Hele werkwoord (bijv. lopen, dansen, rijden)



ben



is



zijn



am



are



heeft



has

Werkwoorduitgang



-s



-t

Appendix C – Participation Score

English version

Participation score

Participant:

Emotional score: How motivated was the participant, when participating in the intervention?

When giving the score, keep in mind how happy the participant was, and how actively the participant went to work on the intervention.

0 = Student was not motivated participating in intervention

10 = Student was very motivated participating in intervention

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Cognitive score: How well did the participant cope in the intervention?

When giving the score, keep in mind how easy it was for the participant to manage the intervention; did the participant get started easily or did the participant have difficulty managing the intervention.

0 = Participant did not cope well in the intervention

10 = Participant coped very well in the intervention

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Dutch version

Participatiescore

Deelnemer:

Emotionele score: Hoe gemotiveerd was de deelnemer tijdens de interventie?

Denk bij het geven van de score aan hoeveel plezier de deelnemer had tijdens de interventie en hoe actief hij / zij met de interventie aan de slag ging.

0 = De deelnemer was niet gemotiveerd tijdens de interventie

10 = De deelnemer was erg gemotiveerd tijdens de interventie

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Cognitieve score: Hoe goed kon de deelnemer de interventie aan?

Denk bij het geven van deze score aan hoe makkelijk de deelnemer overweg kon met de interventie; ging hij / zij makkelijk aan de slag, of was de interventie lastig voor de deelnemer.

0 = De deelnemer kon de interventie niet goed aan

10 = De deelnemer kon de interventie erg goed aan

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Appendix D – GJT

Grammaticality Judgement Task			
Naam leerling			
Geboortedatum leerling			
Naam ambulant begeleider			
Datum van testafname			
Item (zin)	Juist	Onjuist	Wat is er fout aan deze zin?
1. I drove to school yesterday.			
2. The sometimes girls dance.			
3. We read a book.			
4. Yesterday, I go to school.			
5. The boys are old.			
6. You have a dog.			
7. We read sometimes a book.			
8. The students kicks the ball.			
9. The man has read a book.			
10. The woman throw the ball.			
11. We always kick a ball.			
12. The dog walk on the road.			
13. I have a test last week.			
14. The student is walking in the grass.			
15. I did my homework two days ago.			
16. The boys kicking the balls.			
17. The boys eat the apples.			
18. We am children.			
19. The girl wears a dress.			
20. The boy drive in the yellow cars.			
21. I has a bicycle.			
22. You are in the yellow car.			
23. She has long hair.			
24. Girls sit behind the green chairs.			
25. The girl has thrown the box.			
26. Men wear the green shoes.			

27. The students read the books.			
28. We has a cat.			
29. The student eats an apple.			
30. The car are pink.			
31. You have eat an apple.			
32. You have a pink chair.			
33. The boy sits on the yellow chair.			
34. Women wear the green shoes.			
35. The boy has opened the window.			
36. The girls is students.			
37. I have green eyes.			
38. He am a student.			
39. The woman is wearing a green dress.			
40. The dog sitting in the chair.			
41. He have green eyes.			
42. The dog sometimes drinks milk.			
43. The boy kicks the ball.			
44. The girl has drink the milk.			
45. The cat drinks milk.			
46. The dog kick the balls.			
47. I am 12 years old.			
48. Look, the dog drink the water.			
49. The women always wear red shoes.			
50. I go swimming exactly one year ago.			
51. I cleaned the house last week.			
52. The girls are dancing in the street.			
53. Always the girls drive in yellow cars.			
54. We have dance.			

Appendix E – RVT

Receptive Vocabulary Scoring Form				
Naam leerling				
Geboortedatum leerling				
Naam ambulante begeleider				
Datum van afname				
Item	Afbeeldingsnummer			
1. read	1	2	3	4
2. hand	1	2	3	4
3. walk	1	2	3	4
4. sit	1	2	3	4
5. cat	1	2	3	4
6. drive	1	2	3	4
7. ground	1	2	3	4
8. chair	1	2	3	4
9. family	1	2	3	4
10. television	1	2	3	4
11. money	1	2	3	4
12. watch	1	2	3	4
13. eat	1	2	3	4
14. ball	1	2	3	4
15. ask	1	2	3	4
16. move	1	2	3	4
17. open	1	2	3	4
18. find	1	2	3	4
19. work	1	2	3	4
20. wall	1	2	3	4
21. show	1	2	3	4
22. girl	1	2	3	4
23. man	1	2	3	4
24. pay	1	2	3	4
25. picture	1	2	3	4
26. pen	1	2	3	4
27. dance	1	2	3	4

28. help	1	2	3	4
29. window	1	2	3	4
30. teacher	1	2	3	4
31. fish	1	2	3	4
32. building	1	2	3	4
33. road	1	2	3	4
34. carry	1	2	3	4
35. dog	1	2	3	4
36. kick	1	2	3	4
37. year	1	2	3	4
38. start	1	2	3	4
39. drink	1	2	3	4
40. cook	1	2	3	4

Appendix F – SRT

Item	Target	S-score
1.	Wat heeft de prinses vorige maand gekocht?	0 1
2.	Bij de grote rode lampen werd ze gestopt.	0 1
3.	Zij kan het meisje zien door het raam.	0 1
4.	Ze werd hard tegen de grond geduwd.	0 1
5.	Wie hebben zij bij de trap gezien?	0 1
6.	Het meisje moet het vliegtuig op het bord tekenen.	0 1
7.	Wie heeft de aap natgespetterd bij de zee?	0 1
8.	De jongen in de snoepwinkel werd geholpen.	0 1
9.	De jongen moet de vloer in de keuken vegen.	0 1
10.	Wat hebben zij gisteren in de sneeuw gevonden?	0 1
11.	De man had niet met de auto naar huis mogen rijden.	0 1
12.	Ze werd 's ochtends door de dokter bezocht.	0 1
13.	Welke foto heeft hij gisteren gemaakt?	0 1
14.	De agent had ons een bekeuring kunnen geven.	0 1
15.	De jongen werd bang gemaakt door de clown.	0 1
16.	De muis ziet de kaas in de schaal niet.	0 1
17.	Hij had naar de boot moeten zwemmen.	0 1
18.	Welke fles liet de jongen op de grond vallen?	0 1
19.	Zij heeft de schapen op de boerderij niet kunnen voeren.	0 1

20.	De kat had de bal van de trap af kunnen gooien.	0	1
21.	De lunch werd door de timmerman gegeten.	0	1
22.	De kinderen proefden de snoepjes die ze kregen.	0	1
23.	De mensen krijgen een cadeau als ze het huis schoonmaken.	0	1
24.	De bij die de man inslikte had hem pijn gedaan.	0	1
25.	De aap aaide de koe die de worm bang had gemaakt.	0	1
26.	Als de kinderen zich gedragen gaan we de tuin in.	0	1
27.	De jongen die de postbode hielp was verdwaald.	0	1
28.	Hij moet de knuffel wassen waarmee het kind slaapt.	0	1
29.	Hij had zijn vriendin niet meegenomen als ze boos was.	0	1
30.	De pony die de boer bekeek duwde hem opzij.	0	1

Appendix G – Semi-structured interview

Educatie voor de interventie.

- Werd er een specifieke methode gebruikt in de lessen Engels?
- Wat zijn de speerpunten van deze methode?
- Worden expliciete grammaticaregels behandeld in deze methode?
- Wordt er aandacht besteed aan cognaten in deze methode?
- Wat zijn de plus- en minpunten van deze methode?
- Wat zou je willen veranderen aan de methode?

De *CodeTaal* interventie.

- Wat is de algemene impressie van de interventie?
- Wat zijn de plus- en minpunten van de interventie?
- Wat vond je van het broertjes spel?
- Wat vond je van het code gedeelte?
- Zie je jezelf de interventie toepassen in de toekomst?
- Zijn er dingen die je aan de interventie zou willen aanpassen?
- Heb je het idee dat de leerlingen enthousiast aan de slag gaan met de interventie?
- Heb je het idee dat sommige leerlingen meer baat hebben bij de interventie dan andere leerlingen?

Appendix H – Transcription Interview

Welke methode gebruikte je voor de lessen Engels?

Door de fusie gebruiken we sinds dit schooljaar *Groove Me*. Dat is voor mij een nieuwe methode, want daarvoor hadden wij *Let's Go*. Dat was een hele methode waarmee je alleen maar met het schrift bezig was, en heel af en toe een vraag of gesprekjes oefende. *Groove Me* ken ik nog niet zo heel goed. Ik heb toevallig op de website gekeken, als je wil terug vinden wat de onderbouwing daarvan is. Zij proberen vanuit een andere invalshoek kinderen te motiveren. Uit verschillende invalshoeken tot leren te laten komen. Maar wat ik zie is dat bij *Groove Me* de lessen vooral aan de hand zijn van een song, dat is de kapstok van de les en wat mij daarbij opvalt is dat het zowel een deel woordenschat, grammatica, flashcards zoals dat heet, waarbij je woorden of zinnestjes oefent, bevat, maar wat ook steeds terugkomt is gesprekken en dialogen oefenen. Dat is wat ik vooral de afgelopen periode geoefend heb en het punt was dat ik met mijn groep moest insteken op het niveau van groep 7 en 8 en dat is eigenlijk te pittig voor mijn groep. Wij hebben vooral afwisselend woordjes, zinnestjes en gesprekken geoefend die dan vaak al wel zo waren voor-gestructureerd dat je soms alleen maar, bij bijvoorbeeld een vraaggesprek van hoe je de weg vraagt en vertelt hoe iemand moet lopen, links of rechts of rechtdoor in je gesprek hoeft in te vullen, dan is dat zeg maar al zover ingevuld. Dat is mijn ervaring er mee, maar ik geloof dat er een diepere laag onder ligt, maar zo goed is de methode hier nog niet geïmplementeerd dat ik daar antwoord op kan geven. Op de website staat daar wel veel meer over, daar staat een educatieve verantwoording.

De methode die jullie hiervoor gebruikte (Let's Go) was dat ook veel conversatie of juist niet?

Nee veel minder, daar werkte we vooral heel erg vanuit het werkboek, allerlei oefeningen, en heel soms kwam er wel een soort rollenspel of een dialoog. Maar dat was niet structureel in de les, waardoor kinderen dat heel erg lastig vonden en waardoor je dat ook niet heel veel

oefende. *Let's Go* was echt aan de hand van thema's, bijvoorbeeld cijfers of het lichaam, maar dan had je oefeningen zoals woordzoekers of een invuloefening. Ik vond het wat platter, in de zin van dat je heel veel aan het schrijven was en vond dat de kinderen daar ook niet heel vaardig in waren. Ik vond het ook niet echt aansluiten, men was hier ook niet heel erg tevreden over en door de fusie is de methode er ook uitgegaan omdat hij zo goed als afgeschreven was, hij voldeed volgens mij zelfs niet meer aan alle kerndoelen.

Was er bij een van de twee methodes nog een focus op expliciete grammatica instructie?

Bij *Groove Me* weet ik het niet, ik denk het niet, maar zo goed ken ik de methode niet. En bij *Let's Go*, was er wel een unit, van het hoogste deel, over de werkwoordvervoegingen. Maar ook niet dat daar een bepaalde (..) die sloeg ik vaak over omdat ik daar ook niet de handvatten voor had, er werd verondersteld dat je dat door heel veel te doen je eigen maakt en zo werkt dat natuurlijk niet.

Heb je bij de methodes vastgehouden aan het boek of heb je zelf andere materialen toegevoegd?

Heel soms pakte ik er iets anders bij, maar eigenlijk te weinig. Dat komt omdat Engels hier maar een halfuur tot drie kwartier op het programma staat per week. In de praktijk is dat dan vaak een halfuur dat het voorbij komt. Ik heb er af en toe wel eens wat anders bij gepakt, maar dat was dan vaak in de vorm van een werkblad. Betreft *Groove Me*, is dat minder aan de orde, omdat de hoeveelheid stof zoveel is dat ik met de eerste en tweede les binnen het boek wel vier tot zes lessenmomenten bezig ben, dus dan hoef ik niks nieuws er bij te zoeken.

Dan ben ik vooral benieuwd naar je mening over de interventie lessen?

Ik heb (ondanks de vier lessen) er wel een beeld van kunnen vormen. Het sluit aan op een methodiek die logopedisten hier ook gebruiken: *MetaTaal*. Daar ben ik vorig jaar met de logopedist mee bezig geweest, voor een andere groep die wat taal zwakker was, om dat ook een beetje klassikaal te gebruiken. En ik zie dat dat helpt, en ik zie de link tussen *MetaTaal* en

CodeTaal. Ik zie dat het voor kinderen, de grammatica wat in beide methodes (*Let's Go* en *Groove Me*) bijna niet aan orde komt, wel inzichtelijker wordt. Dat is onder andere een van de dingen die we vaak van oud-leerlingen terug krijgen. Dat leerlingen met TOS op VO-scholen daar vaak moeite mee hebben, en ik denk wel dat door deze manier, en dat baseer ik dan ook wel een beetje op mijn ervaring met *MetaTaal*, dat het baat heeft en dat het ondersteunend is. En je zegt terecht dat het maar vier sessies waren, maar ik denk wel dat als het structureel aangeboden wordt, dat er meer handvatten voor kinderen zijn om de overstap naar het VO zo dadelijk te maken, als ik het vanuit mijn perspectief bekijk. Het mooie zou dan misschien op den duur zijn dat *MetaTaal* en *CodeTaal* een zelfde soort vorm krijgen, dat kinderen zodra niet gaan stoeien met de rondjes en vierkantjes van wat het ook alweer precies betekend, en met *MetaTaal* werken ze met lego-blokjes. Dat is misschien iets voor de toekomst, maar ik zie daar wel profijt bij.

Dus je zou op het moment dat CodeTaal en MetaTaal gelijker aan elkaar zouden zijn, zou je dan jezelf de lessen zien implementeren?

Misschien zou dat een soort utopie zijn dat het mooi zou zijn als dat overloopt in elkaar. Maar ik zou dit ook zeg maar los van *MetaTaal* of naast een Engelse methode ook kunnen gebruiken, en ik denk omdat het ook wel een meerwaarde heeft. Kijk we hebben hier nu *Groove Me* in huis, en dat is zoals ik het zie vooral op woordenschat en dialogen gericht en dat is heel fijn, dat moet geoefend worden, maar *CodeTaal* zou er ook naast gebruikt kunnen worden. Dat je een afwisseling maakt tussen lessen of dat je het op den duur implementeert in de oefeningen die voorbij komen. Dat als je dan een aantal zinnen hebt die in een dialoog geoefend moeten worden dan zou je *CodeTaal* daar bij kunnen gebruiken.

Zie je jezelf het broertjesspel ook toevoegen in een les of zie je vooral de meerwaarde van de expliciete grammatica uitleg?

Ik zie zeker de meerwaarde van het code gedeelte. En voor het broertjesspel denk ik ook wel, je maakt het netwerk aan woorden rijker. Ik vraag mij alleen af, van de codes zie ik wel dat je dat kunt toepassen in de bestaande methode, voor het broertjesspel zal het iets meer aanpassing vragen. Bij *Groove Me* hoort een arsenaal aan woorden en dan is het maar de vraag of die woorden zich daar altijd voor lenen. Ik zeg niet dat het niet kan, maar ik zie voor het code-gedeelte dat het makkelijker toe te voegen is in een bepaalde methode.

Zou je de methode an-sich willen implementeren of zou je het altijd willen combineren met iets anders?

Ik denk dat het eerst als methode moeten worden aangeboden. Het implementeren van de methode zou dan een soort verrijking zijn als alle vormen en kleuren behandeld zijn. We gaan er volgend schooljaar naar toe dat Engels hier alleen in groep 7 en 8 wordt aangeboden en dan denk ik dat het maar de vraag is of je het implementeren van de methode in twee leerjaren voor elkaar krijgt. Als je en *Groove Me* hebt en *CodeTaal* dan moet het misschien naast elkaar optrekken, maar dat je misschien soms zijdelings een sprongetje maakt naar *Groove Me* als je wat verder bent met *CodeTaal*. Maar ik denk dat twee leerjaren er te kort voor is. Zeker als je van van drie kwartier per week uit gaat, dan zou de frequentie van Engels omhoog moeten in de week, praktisch gezien.

Wat voor kinderen hebben baat bij de interventie? Heb je het idee dat bepaalde kinderen er makkelijker mee aan de slag gaan?

Ik denk wel dat leervermogen het makkelijker maakt. Ik merk in de lessen dat het voor een aantal kinderen die een uitstroom hebben naar vmbo-t / havo soms misschien te langzaam ging, die leerlingen hadden het sneller door. En een aantal zwakkere leerlingen daar voor ging het precies goed voor. Dus ik denk wel dat leervermogen echt een item is als je het hebt over het leren van een andere taal. Want daarnaast zijn het allemaal leerlingen met een TOS, binnen onze school heb je natuurlijk ook TOS+, en TOS commutatief meervoudig beperkte,

die hebben ook nog moeite met de Nederlandse taal. Ik zie vooral ook wel in deze klas dat het met leervermogen te maken heeft. Ik zie dat de kinderen die een hoger uitstroom niveau hebben het makkelijker oppikken. Ik denk dat de kennis van Engels voor iedereen een beetje hetzelfde is, via Youtube of gamen. De woordjes die ze daar horen zien en onthouden. Want als je bijvoorbeeld in Groove Me echt gesprekken aangaan, dan zie je wel dat het voor allemaal wel lastig is. Door het zien van de structuur van de taal is dat het leervermogen een item is dat helpend kan zijn, maar ik denk wel dat het voor alle kinderen helpend is. De kinderen die er meer moeite mee hebben hadden het principe wel door. Die hadden misschien iets meer oefentijd nodig, maar voor hen werd de structuur van Engelse zinnen en grammatica wel duidelijk. Ik denk dus wel dat ze er allemaal profijt bij hebben, maar net zo goed zoals het hier met rekenen of andere zaakvakken gaat, zie je wel tempoverschillen.

Het is niet het idee dat kinderen met een al wat betere Engels kennis dat het daar makkelijker voor is, omdat het eigenlijk redelijk gelijk ligt?

-- specifieke info over leerling --