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OF NORWAY

Faculty of Humanities, Social Sciences and Education

The Effect of Norwegian Dyslexia Friendly Schools: The Acquisition of L2 English in 6th and 7th Grade

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ENG-3991: Master's Thesis in English Linguistics, May 2016



Acknowledgements

First and foremost, I wish to thank my supervisor, Professor Marit Westergaard, for her support, encouragement and valuable insight throughout the whole process of writing this thesis. I owe a special thank you to Björn Lundquist for helping me with my statistical work. I wish to thank Professor Turid Helland for her helpful comments and positive reaction towards my project.

I am grateful to all the courageous children who participated in my project. Many thanks to the staff of the four dyslexia friendly schools: Solneset skole, Slåtten skule, Rustad skole (Ås) and Sjøstrand skole. I owe a special thank you to Gjertrud Kalseth at Solneset skole for meeting me with such an open and friendly attitude from the very beginning of my project and for making the testing of her students possible.

I dedicate this Master's thesis to my family; to my clever and brave son, Gustav for being my motivation at all times, to my beautiful daughter, Kathrine for at all times believing that I could complete my work and to my husband, Søren for always being there for me. Finally, a special thank you is to my sister Elisabeth, my mom and my best friend Elisabeth for their love and support.

Det er umuligt, sagde Tvivlen

Det er farligt, sagde Frygten

Det er unødvendigt, sagde Fornuften

Gør det alligevel, sagde Hjertet

Annette Mygind Stagelund, Tromsø, May 2016

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Introduction

The main objective of this Master's thesis is to discuss whether the Norwegian dyslexia friendly schools have a positive effect on dyslexic students learning English as a second language compared to dyslexic students at non-dyslexia friendly schools in Norway. The secondary objective is to examine if there is an effect on non-dyslexic students as well.

My specific interest in dyslexia is due to my 13-year old dyslexic son. Since he was a small child, he struggled with literacy in school. His social skills were extremely high and he thrived in other subjects, such as sports and History class. He could sit and listen to exciting stories, remember them and tell very enthusiastically and reflectively about them when he came home from school. We as his parents started to wonder, as he got into 2nd and 3rd grade, why he seemed to struggle so much in reading and writing, Math and English class, but at the same time seemed to function normally in all other spectra. What was frustrating was that our school did not listen to our concerns. In 5th grade, he started at a new school and got a contact teacher who initiated the process of getting him tested for dyslexia. This is when I began to look into what we could do to help him in the best way, and I discovered that there existed something called *dyslexia friendly schools* in Norway. What I found out as well was that there did not seem to exist studies concerning the effect of Norwegian dyslexia friendly schools on second language acquisition (English) in dyslexic children in Primary school. Therefore my main focus in this thesis is on dyslexia and learning English as a second language by 6th and 7th grade children in Norway attending dyslexia friendly schools.

The acquisition of literacy is the highlight of children's educational development and a major achievement to obtain. Literacy is indeed essential, and if this skill is not mastered, the possibility of becoming successful later in life declines. Most children find it enjoyable and relatively unproblematic to learn how to read and write, and they become skilled, independent and autonomous readers from early on. However, this is not the case for all children. Some need to receive extra help and will later become good readers. Others, on the contrary, experience significant problems in learning how to read and write due to the specific learning disability *dyslexia*. Being a dyslexic child often has considerable consequences, especially if the proper help and support is not provided. The feeling of being different is very much a part of dyslexic children's lives, and going to school is often a struggle and a humiliating experience that most often affect

them further on in life. Learning one or more languages is an important competence to master because of the worldwide communication through mass media that is very much a part of our lives today. Nonetheless, acquiring a second language in the educational system puts an extra and often unbearable burden on dyslexic students. Inspired from England, the Norwegian dyslexia organization, *Dysleksi Norge*, has initiated a project called *dyslexia friendly schools* covering Primary, Secondary and High schools in Norway. The project has developed gradually over the last 11 years and has resulted in 28 dyslexia friendly schools. The aim is to make Norwegian schools an inclusive and accepting environment for all children and specifically for children with dyslexia.

I have carried out an investigation where the focus is on specific areas of language acquisition that seem to be difficult for dyslexics. These are: text comprehension, oral production, grammatical structures and literacy. For this purpose, I tested eight dyslexic and 15 non-dyslexic students at four different Norwegian dyslexia friendly schools and used the test battery called the *English 2 Dyslexia Test*¹. I compare these results to a former study (Helland and Kaasa, 2005). Helland and Kaasa (2005) tested 20 dyslexic students from 6th and 7th grade at six non-dyslexia friendly Norwegian schools and compared them to 20 non-dyslexic students using the *English 2 Dyslexia Test*. The main focus is on the comparison between the two dyslexic groups (2016/2005). A secondary focus is on examining whether there is a positive effect of the dyslexia friendly schools on non-dyslexic students as well, so a comparison is made between the two control groups from 2016 and 2005 and additionally between the dyslexic and control group from the dyslexia friendly schools (2016) and the dyslexic and control group from the non-dyslexia friendly schools (2005).

The results provide new and important knowledge to the field of dyslexia and language acquisition of English in favor of the dyslexia friendly schools. The results show that the 2016 dyslexic students scored significantly higher than the 2005 dyslexic students in two areas of the test, reading and oral production. The 2005 dyslexic students scored significantly higher in a sub-scoring test in syntax and semantics. Comparing the two control groups, the 2016 control group scored significantly higher on the reading, spelling and oral production tests. Again, the 2005 control group had significantly higher scores in syntax and semantics. Finally, comparing the 2016 results (dyslexic group vs. control group) with the 2005 results (dyslexic group vs. control group), the results showed that the control groups outperformed the dyslexic groups, except in the 2016

¹ Designed by Cand. san. Randi Kaasa, Cand.philol. Signe Marie Sanne and Dr. Polit., Professor Turid Helland in 2004

dyslexic group where a result was non-significant in an oral production test. When Helland and Kaasa (2005) executed their study, they divided their dyslexic group of 20 into two subgroups; a Comprehension+ (C+) group and a Comprehension- (C-) group. Like Helland and Kaasa (2005), I divided my eight dyslexic students into two subgroups (four in each group). Overall, the subgroup results show a positive effect in the 2016 subgroups in comparison with 2005.

The structure of this thesis is as follows:

Chapter 1 provides an historical overview of dyslexia (1.1) and goes back to the late 1890s when reports about reading disabilities start to appear from different doctors as well as suggestions about their treatment. Next follow examples of different definitions on developmental dyslexia (1.2), suggestions about the causes of dyslexia (1.3) a discussion of whether there are subtypes of dyslexia (1.4) and associated learning differences (1.5). *Chapter 2* presents two hypotheses on second language acquisition and dyslexia i.e. the Linguistic Coding Differences Hypothesis (2.1) and the Orthographic Depth Hypothesis (2.2) and an overall view on the challenges dyslexic students face in the attempt to learning a foreign language (2.3). Then, I provide a description of what difficulties dyslexic Norwegian students experience in learning English as a second language (2.4). *Chapter 3* deals with three issues: the principles of the dyslexia friendly schools in Norway (3.1), stimulation and teaching methods for dyslexic students (3.2), and finally what dyslexic students experience when preparing and passing tests in school (3.3). *Chapter 4* includes the purpose of the research project (4.1) followed by the method (4.2), i.e. information of official permissions, description of the test battery, introduction of the participants and the procedure of the research project. *Chapter 5* contains the results from the test: a description of Helland and Kaasa's (2005) results (5.1), the author's results, 2016 (5.2) and a comparison 2016 vs. 2005 (5.3). *Chapter 6* provides a discussion of the results: comparison of the two dyslexic groups (6.1), comparison of the two control groups (6.2) and finally, comparison of the 2016 dyslexic group vs. the control group with the 2005 dyslexic group vs. the control group (6.3). Limitations of the research project are presented as well (6.4). *Chapter 7* provides the conclusion.

Chapter 1

Dyslexia

This chapter presents

- **a historical overview (1.1)**
- **a definition of dyslexia (1.2)**
- **different causes of dyslexia (1.3)**
- **subtypes of dyslexia if any? (1.4)**
- **Associated learning differences (1.5)**
- **a summary**

1.1 A historical overview

Early reports on reading disabilities are traced back to the late 1890s. A German eye doctor, Rudolph Berlin, began to write about individuals who had been brain injured or had a disease in the brain and from that had lost the ability to read and/or had problems with spoken language. Nevertheless, they seemed to have other aspects of their intelligence intact (Kamhi, and Catts, 2012, Shaywitz, 2003). What also interested doctors at that time were children who had difficulties in learning how to read in spite of sufficient instruction and without having a malfunction in the brain. Doctors started to see similarities between the two sets of problems. According to Shaywitz (2003), an English doctor, W. Pringle Morgan described in 1896 in the British Medical Journal a young 14-year old boy, who was bright and “quick at games and in no way inferior to others his age” (p. 13), but he had severe problems in learning how to read. Even after seven years of thorough instruction, he was not able to read or spell simple words. Morgan referred to this as “congenital word blindness” (Kamhi & Catts, 2012: 46). Another doctor, the Scotsman James Hinshelwood published several papers describing how he believed that word blindness was hereditary and innate and that these children needed special, instructional, one-to-one teaching in reading by the use of multisensory input. His opinions are remarkably similar to today’s views on treatment of developmental dyslexia. Another doctor, who has had a major impact on developmental dyslexia and especially on how it is treated, is the American Samuel T. Orton. He was interested in speech and reading problems in school children and did far-reaching research in, among other things, the recognition of how common the disability was and claimed that the rate of children with speech and reading problems were far more common than what Hinshelwood had claimed, which was 1/1000

(Kamhi & Catts, 2012). This is consistent with current knowledge, which is that developmental dyslexia affects as many as three to ten percent of the population (Snowling, 2008, Muter, 2005). Orton is very famous for his intervention program, which he described in the early 1930s together with his colleague Anna Gillingham, and this is also what Hinshelwood was in favor of, namely multisensory learning (Kamhi & Catts, 2012). It became known as the *Orton-Gillingham Approach*, and there is in fact an academy in the U.S today called the Academy of Orton-Gillingham Practitioners and Educators². All in all, the knowledge of dyslexia is a little over a century old, and the cases discovered by Morgan, Berlin, Hinshelwood and Orton, and many others over the last many decades, have all provided important knowledge about the nature and basis of dyslexia.

1.2 Defining dyslexia

Over the last 50 years, research on dyslexia and its nature has rapidly grown (Snowling, 2012). There exists a range of definitions and terms that encapsulate the term *dyslexia* and therefore it is first of all important to distinguish between the two terms *acquired dyslexia* and *developmental dyslexia*. Acquired dyslexia is the result of head trauma or a disease, which as mentioned in the previous section has caused a normal function in the brain to be damaged. Thus, this type of dyslexia occurs after an individual has learned how to read (Harley, 2014, Christo, Davis & Brock, 2009, Kormos & Smith, 2012, Nijakowska, 2010). Developmental dyslexia, on the other hand, is a specific learning disability that predominantly affects the ability to learn how to read and spell, and in addition has other associated factors, which make the face of dyslexia multifaceted (Snowling, 2008, Reid, 2009a). Developmental dyslexia is the type I focus on in this thesis.³

As mentioned above, there are indeed a variety of definitions in the literature on dyslexia which first of all varies in regard to which associated factors are included, and secondly tell us that defining dyslexia is not a simple task (Helland, 2008). It is important to define dyslexia because it provides help and guidance to teachers and gives valuable information about the nature of literacy difficulties. Moreover, definitions of dyslexia provide awareness of the disability in general and hopefully give important information on what kind of intervention programs that are effective. However, having several definitions may cause confusion and express too general facts on dyslexia, which will mislead practitioners as well as hinder good guidance for intervention (Reid, 2009a). To

² <http://www.ortonacademy.org/>

³ I will be using the term *dyslexia* when I refer to *developmental dyslexia* in the rest of this thesis

get an idea of the variety of definitions, I provide different suggestions on this matter in the next paragraph.

Dyslexia is classified in both the *International Classification of Diseases and Related Health Problems* and in the *Diagnostic and Statistic Manual of Mental Disorders* and refers to an individual who has difficulties in learning how to read, spell and “acquire the technique of writing because of a lowered motor ability and coordination of hands” (Nijakowska, 2010: 2). The *British Dyslexia Association* (BDA) states the following:

“[d]yslexia is a specific learning difficulty that mainly affects the development of literacy and language related skills. It is likely to be present at birth and to be life-long in its effects. It is characterised by difficulties with phonological processing, rapid naming, working memory, processing speed, and the automatic development of skills that may not match up to an individual's other cognitive abilities. (BDA Management Board, 2007)⁴

The BDA Code of Practice for Employers⁵ includes “difficulties with auditory and /or visual perception.... particularly related to mastering and using written language, which may include alphabetic, numeric and musical notation”. The *British Psychological Society on Dyslexia, Literacy and Psychological Assessment* defines dyslexia as follows: “Dyslexia is evident when accurate and fluent word reading and -/or spelling develops very incompletely or with great difficulty. This focuses on literacy learning at the “word level” and implies that the problem is severe and persistent despite appropriate learning opportunities” (Hartas 2006: 11).

The *International Dyslexia Association* (2003) provides a definition which contains many key features of research:

“Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include

⁴ <http://www.bdadyslexia.org.uk/dyslexic/definitions>

⁵ <http://www.bdadyslexia.org.uk/dyslexic/definitions>

problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge”. (The International Dyslexia Association (2003)⁶

In sum, the above mentioned definitions show that dyslexia primarily has to do with literacy and phonological processing difficulties. Additional factors are short-term memory, rapid naming, processing speed and automaticity. What also can be concluded from the above is that special teaching and specific learning approaches are of great importance.

According to Harley (2014), dyslexia is a term frequently used to describe both reading and writing/spelling difficulties. However, Harley (2014) states that this is in fact misleading because the term for spelling/writing difficulties is *dysgraphia*. The two disabilities are usually linked, but not necessarily identical processes. Evidence shows that some dyslexic individuals in fact can read well but be poor at spelling (Snowling, 2008). According to Shaywitz (2003), spelling difficulties often persist through life even when a child has improved his or her reading abilities through specialized instruction. Spelling is often considered a more difficult task for dyslexic children than reading (Reid, 2003, 2009a, Snowling, 2008), which primarily has to do with difficulties in connecting phonemes and graphemes as well as processing syntax and semantics at the same time (Reid, 2009a, Snowling, 2008). In addition, poor spelling and speech difficulties are closely linked together. Many dyslexic children experience speech difficulties to different degrees, which often surprise parents and teachers because children are typically able to pronounce all sounds individually without problems. The reason why spelling and speech difficulties are often connected is because the speech-processing system is the foundation of both the development of speech and the development of literacy and the link is phonological awareness. Snowling and Stackhouse (2008) describe it as follows: “Any difficulty that children have in their basic speech-processing system will thus result not only in spoken difficulties, but also in problematic phonological awareness development, which will in turn impact on their literacy performance.” (p. 23).

Often dyslexic children experience reading comprehension difficulties due to poor phonological decoding and word recognition skills. Snowling (2012) describes it as follows: “Problems with slow and inaccurate word reading can, in turn, be a bottleneck that impedes adequate reading

⁶ <http://eida.org/definition-of-dyslexia/>

comprehension” (p. 7). Therefore, it is important to distinguish between the similarities between dyslexia and Specific Language Impairment (SLI). Both are hereditary and have a fundamental influence on children’s lives both educationally and psychosocially (Bishop & Snowling, 2004). SLI basically concerns problems with comprehending and producing language. Specific language impaired children have difficulties with vocabulary and phonological processing as well as morphosyntax, which is a specifically problematic domain (Leonard, 2009). A child is diagnosed with SLI when “oral language lags behind other areas of development for no apparent reason” (Bishop & Snowling, 2004: 858). Thus, these children have severe difficulties in conversation situations. Also, a large number of children with SLI strive with literacy problems similar to dyslexic children (Kormos & Smith, 2012). The above certainly sounds similar to dyslexia. However, there seems to be a growing consensus that the disorders are not similar because “even though many children with dyslexia have oral language problems, a high proportion of them would not meet criteria for SLI because their oral problems are neither severe nor persistent (Bishop & Snowling, 2004: 865).

Some children struggle specifically with reading comprehension, which resembles with dyslexia and SLI. These children, often referred to as *poor comprehenders*, are able to read and spell accurately, so they have good phonology skills, but they lack the ability to understand the meaning of written text. It is thus their good phonological skills that make them good readers, but they seem to lack basic language skills in regard to oral language, vocabulary and grammar knowledge from very early on (Snowling, 2012, Kamhi & Catts, 2012). Moreover, they have difficulties with “inferencing and figurative language use as well as in text-related processes including comprehension monitoring and knowledge of story structure” (Snowling, 2012: 2). However, their short-term memory span seems to be good regarding simple memory tasks, where more difficult and abstract tasks often cause problems. Overall, Snowling (2012) states that it seems as reading comprehension impairment can be seen as a distinct disorder and therefore not as dyslexia. This category of language impairment has not been studied as much as dyslexia and is often hidden in classrooms and is in fact relatively common. Hulme and Snowling (2011) claim that “a reasonable view would be that most of these children have a subclinical language difficulty, which is manifested clearly in their reading-comprehension problems” (p. 141).

When it comes to dyslexia and the role of IQ, it is important to note that dyslexic individuals mostly have a normal IQ and often above average (Snowling, 2008). Besides, they frequently show talents

in other areas like sports, computers and arts (Nijakowska, 2010). Shaywitz (2003) argues that dyslexic children show other intellectual abilities in thinking and reasoning as well as great imagination, surprising maturity and excellent comprehension of stories read aloud or told to them.

A final issue worth mentioning is the emotional aspect of dyslexia. It is difficult to write about dyslexia without commenting on the feelings that go hand in hand with the learning disability. Studies have shown (Piechurska-Kuciel, 2008) that the vast majority of dyslexic children experience high levels of anxiety, worry and stress, which in worst cases can lead to depression and withdrawal from socializing with others. The fear of failure in learning how to read and spell as well as meeting other daily demands in academic environments invite dyslexics to feel frustrated and scared and act out with anger and hostility towards everything that has to do with school. Avoidance tactics becomes a part of the students' everyday lives, e.g. going to the toilet, looking for books, sharpening pencils and perhaps acting out as the "class clown" when it is their turn to perform. In sum, it seems safe to say that being a dyslexic student most often causes stress and anxiety. Furthermore, there is a good chance that these feelings will persist throughout the lifetime and may potentially give the dyslexic a habit of avoiding relationships with others (Nijakowska, 2010). In the next section, I look into what is researched on the causes for dyslexia.

1.3 Different causes of dyslexia

It seems to be well established by a large amount of research that there is a genetic component in dyslexia (Snowling, 2008, Reid, 2009a, Ramus *et al.*, 2003). Nijakowska (2010) affirms that "converging evidence has accumulated in support of substantial heritability in dyslexia" (p. 35). Snowling (2012) agrees and calls dyslexia "a neurodevelopmental disorder with a probable genetic basis", which is "persistent across the lifespan" (p. 1). It is important to focus on children who are *genetically at risk* of dyslexia in order for an early identification to be made (Reid, 2009a). In addition, studies have revealed that the brain in dyslexics shows separate characteristics of brain anatomy and brain activity from non-dyslexics during phonological processing and reading tasks (Shaywitz, 2003, Nijakowska, 2010, Schneider & Crombie, 2003). This has been demonstrated using highly sophisticated neuroimaging technology. Shaywitz (2003) states that an "underactivation in the back of the brain provides a neural signature for the phonological difficulties characterizing dyslexia. This signature seems to be universal; it is true of dyslexics in all languages and of all ages" (p. 82).

There has been much discussion concerning whether more boys than girls are affected (Hulme & Snowling, 2009, Kamhi & Catts, 2012). here seems to be evidence suggesting that more boys than girls with a family history of dyslexia have a 50 percent higher risk of being dyslexic (Kormos & Smith, 2012). However, according to Shaywitz (2003) this is not the case. She did a longitudinal study back in the early 1980s at Yale University School of Medicine consisting of 445 children over a period of 20 years, and here she found “no significant difference in the prevalence of reading disability in the boys and girls we identified” (p. 32). In fact, Shaywitz discusses the possibility of the “typical” view on boys in school opposite girls and claims that boys often are referred for further evaluation because they act more out in class. Teachers are faster in rating them as having “behavioral issues”, where girls have another more quiet behavior and therefore often avoid the teacher’s attention.

In the next sections, I discuss the three most dominant explanatory hypotheses in the literature which is the *Phonological deficit Hypothesis (PDH)*, the *Magnocellular deficit hypothesis (MDH)* and the *Cerebellar deficit hypothesis (CDH)*.

1.3.1 The Phonological Deficit Hypothesis

As mentioned in section 1.2, it is agreed on by most researchers that the underlying cause of dyslexia is a phonological deficit, which has an impact on the processing of speech sounds and also has a significant impact on literacy (Snowling, 2012). This is what is argued by the *Phonological Deficit Hypothesis (PDH)*. In order to ensure terminological clarity, it seems correct to briefly touch upon the frequently used terms *phonological awareness*, *phonemic awareness* and *phonics*. Phonological awareness signifies an overall level of awareness of phonological elements (sounds), i.e. phonemes, syllables, onsets and rimes. Rhyming is a helpful (and entertaining) tool for children in the practice of phonological awareness as seen in the following:

Bump!

Bump!

Bump!

Did you ever ride a Wump?

We have a Wump

with just one hump. (Shaywitz, 2003: 181)

Thus, if we look at the word *bump*, the phonemes are /'bʌmp/, there is one syllable, the onset (the initial sound unit of a word before the vowel) is *b* and the rime (the rest of the word including the

vowel) is *ump*. Phonemic awareness on the other hand concerns specifically the *identification* of individual phonemes in spoken words and the ability to *manipulate* sounds, i.e. delete, add and substitute. As an example, the three-letter word *cat* consists of 3 phonemes /k/, /æ/, and /t/ (identification). If we *delete* the first sound /k/, we are left with /æ/ and /t/ now pronounced as *at*. We can *add* the phoneme /s/ to the final sound and we get *cats* or *substitute* the /k/ with a /b/ and get *bat*. Now, phonics is related to print and is when children learn that letters correspond to sounds and that written language has rules and patterns, i.e. they acquire the *alphabetic principle* (Nijakowska, 2010, Kormos & Smith, 2012). According to Frith (1985), when children are to “break the reading code”, they go through three stages; the *logographic*, the *alphabetic* and *orthographic*. The logographic stage is where four-to-five year old children recognize and memorize visual salient cues like for example the Coca-Cola logo or a red stop sign and thus focus more on the shape and length than the exact word per se. The alphabetic stage is where children are from around age six-seven, and here they start to grasp the sound-to-letter relationships i.e. that spoken words have individual units of sounds that can be manipulated into written letters. In other words, they develop phonemic awareness and begin to read words that are unknown and sound them out. Last is the orthographic stage, where children are approximately 10-11 years old and become acquainted with more complex letter combinations (e.g. *-tion* and *-able*) and can recognize words automatically, faster and more accurately. What happens is that dyslexic children seem to fail the transfer from the logographic to the alphabetic stage of reading and are “trapped” there longer than other normally developing children. Therefore they lag more and more behind and struggle to keep up with their peers. Word identification and text comprehension is simply weakened by the phonological deficit and this often masks the very good comprehension skills these children actually have (Shaywitz, 2003, Kamhi & Catts, 2012). In connection to this, children learn how to read in different ways in different languages. For instance, in alphabetic orthographies (letters represent phonemes), it comes down to whether the native language of a child has a *deep orthography* (i.e. inconsistency between spelling and the sounds of a word as in English, French and Danish) or a *shallow orthography* (i.e. regularity between spelling and sounds as in Italian, Norwegian and Finnish). Children who speak languages with shallow orthographies learn to decode more easily and are faster at acquiring awareness of the phonemic structure of spoken words than children who for instance speak English, which I will come back to in chapter 2 (Vellutino *et al*, 2004, Snowling & Stackhouse, 2008, Hulme & Snowling, 2009, Harley, 2014, Nijakowska, 2010).

Short-term/working memory has also turned out to be connected to the phonological deficit, which for instance is shown when a dyslexic child is not able to remember as many verbal items as non-dyslexics and thus has problems following a list of instructions (Snowling, 2008, Nicolson & Fawcett, 2008). Vellutino *et al.* (2004) states that "... weak phonological coding can lead to difficulties in storing and/or retrieving printed words as unitized and distinctive orthographic representations as well as to difficulties in processing information in working memory" (p. 12). Vance & Mitchell (2008) state that short-term memory possibly lasts only 1,5 - 2 seconds and if not transferred to the *long-term memory*, the information is lost. Long-term memory may be impaired in dyslexic children, which can be seen, e.g. in the attempt to remember what the last lesson was about, or what vocabulary and spelling that was practiced earlier that day or week. Thus, long-term memory and short-term memory interact with one another. Overall, this knowledge is particularly important for teachers because they need to repeat information several times to ensure that the dyslexic children have a chance in following the instruction in class.

A modified version of the PDH is the Double Deficit Hypothesis (DDH), which argues that dyslexic children, besides from having a phonological deficit have a difficulty with *naming speed*, also called *Rapid Automatized Naming*, RAN (Vellutino *et al.*, 2004, Nijakowska, 2010, Kormos & Smith, 2012). A study by Denckla and Rudel (1976, cited in Hartas, 2006) showed that a group of dyslexic children showed naming speed difficulties of different familiar objects (e.g. toys and household items) and naming them as fast as possible was a very difficult task. Wolf and Bowers (1999) claim that the phonological deficit and RAN are two separate and independent subtypes of poor reading skills in dyslexics. However, they posit a third subtype of reading difficulties, which is a combination of the two, *the double deficit*. It is a subtype that concerns the most severely impaired performances in reading (Vellutino *et al.*, 2004, Kormos & Smith, 2012). Kormos and Smith (2012) among others argue nevertheless that most dyslexics struggle with both naming speed and phonological processing, and therefore it is not only one of them that typically are the issue. Thus, they find that "the Double-Deficit Hypothesis might not be tenable" (p. 35), but Kormos and Smith acknowledge that the DDH has lead to an important focus on the training in naming speed along with phonological awareness support in intervention programs. Vellutino *et al.*, 2004 concludes as well that "... [t]he double deficit hypothesis can be challenged on theoretical, interpretive, and methodological grounds." (p. 14).

1.3.2 The Magnocellular Deficit Hypothesis and the Cerebellar Deficit Hypothesis

The Magnocellular Deficit (MDH) explains dyslexia as a deficit in the visual as well as the auditory system. The part of the brain that controls visual and auditory signals is called the *magnocellular pathway*. Because this pathway is related to both systems, two separate theories are created, the *Visual Magnocellular Hypothesis* and the *Auditory Magnocellular Hypothesis* (Kormos & Smith, 2012). The Visual Magnocellular pathway may be related to *visual stress*, a term signifying that the ability to read and understand texts is interrupted (Singleton, 2009). Visual stress is estimated to affect approximately 50% of dyslexics (Whiteley and Smith, 2001). The Auditory Magnocellular pathway is claimed to be related to slow auditory processing (Kormos & Smith, 2012, Nijakowska, 2010).

The Cerebellar Deficit Hypothesis (CDH) indicates that there is a malfunction in a specific part of the brain, the cerebellum (the small brain), and this causes disturbances in automatization and muscle tone as well as gait and limb movements (Nijakowska, 2010, Nicolson & Fawcett, 2008). The CDH is linked to another hypothesis called the Automatization Deficit Hypothesis, which proposes that dyslexics have difficulties with automatizing new skills in all areas of learning and that this is the core of all learning problems. This means that there is basically a phonological, a working memory, a speed and learned skill (motor skills, balance, hand writing) deficit in every dyslexic child (Nicolson & Fawcett, 2008). In conclusion, a solid amount of research has been carried out on the MDH and the CDH, and according to Kormos & Smith (2012), “neither of these theories has received sufficient empirical support” (p. 37). Two studies support these statements, which I summarize next.

Ramus *et al.* (2003) did a multiple case study of dyslexic adults with the aim of thoroughly evaluating the PDH, MDH and CDH and being able to answer questions about their relationship or the lack of it. They tested 16 dyslexic adults and the same number of controls in a full battery of psychometric, phonological, auditory, visual and cerebellar tests. All in all, they found data supporting the PDH in all dyslexics. Results revealed ten students with an auditory deficit, four with a motor deficit and two with a visual magnocellular deficit. It was concluded that a phonological deficit was present with or without other sensory or motor deficits, and those who had an auditory deficit had a worse phonological deficit than the others. Finally, though the other mentioned elements were present in some of the students, evidence was not consistent with the MDH, the Automaticity deficit or the CDH.

White *et al.* (2006) performed a study examining the role of sensorimotor impairments in dyslexia. The authors did a comparison between 23 dyslexic children and 22 control children assessing literacy as well as phonological, visual, auditory and motor abilities. The conclusion was similar to Ramus *et al.* (2003), as the dyslexic children showed overall significant impairment on the phonological tasks, but not on the sensorimotor tasks. Individual data implied that most prevalent impairments were seen on the phonological and visual stress tasks suggesting that the most of the dyslexic children had one of the two. Lastly, there was little evidence of other visual, auditory or motor deficits in the dyslexic children. In sum, these two studies state that the PDH is the core of dyslexia and that other deficits may be present but are not the causal explanation of dyslexia.

1.4 Subtypes of dyslexia if any?

As expressed above, substantial evidence shows that a phonological deficit is the core of dyslexia (Snowling, 1998, 2008, Shaywitz, 2003, Ramus *et al.*, 2003, White *et al.*, 2006, Reid, 2009a, Vellutino *et al.*, 2004). Evidence mainly comes from intervention and training studies which have shown that direct instruction taught to enable letter-sound correspondence and phonological awareness have had positive effects on word identification, spelling and reading ability. The question is whether there are subtypes of dyslexia or whether all dyslexics share the same characteristics. As mentioned in the previous section, this has been debated heavily among researchers. In the 1990s, Castles and Coltheart (1993) suggested that dyslexic children either have *phonological dyslexia* or *surface dyslexia*. This is argued within the *dual-route* framework (Vellutino & Fletcher, 2006), which means that there exist two routes for reading, a sublexical route related to phonological awareness and a visual-orthographic lexical route. Phonological dyslexia is when a child shows severe non-word reading difficulties (e.g. *sworf*) and problems in using letter-to-sound rules and thus has difficulties in sounding out unfamiliar words (e.g. *flute*). Surface dyslexia on the other hand, is when a child reads non-words and regular words relatively accurately and seems to master the alphabetic principle. However, the child shows a deficit in reading irregular words correctly (e.g. *yacht*) because of an overreliance on the phonological strategy (Hulmes & Snowling, 2009: 51, Nijakowska, 2010). Castles and Coltheart (1993) performed a wide cited study where they tested 56 dyslexic children and the same number of non-dyslexics matching in age on non-words and irregular words. The results indicated that there were two varieties in developmental dyslexia. However, the control group's reading skills showed to be far better than the dyslexic group and therefore critics expressed that by matching children who were not at the same reading

level, made it impossible to examine if the differences between the groups were due to the reading difficulties in the dyslexia group or different levels of reading experience (Hulmes & Snowling, 2009). Hulmes and Snowling (2009) explain it as follows:

“Essentially, by comparing children who differ in levels of reading achievement, it is not possible to judge whether apparent group differences between good and poor readers are a cause of their reading problem or a consequence of different amounts of reading experience. To get around this problem, a common strategy is to compare children with dyslexia, not only with children of the same age who are normal readers but also with younger children matched for reading age..” (p. 53)

Thus, two follow-up studies by Manis, Seidenberg, Doi, McBride-Chang and Petersen, 1996 and Stanovich, Siegel and Gottardo, 1997 (cited in Hulmes & Snowling, 2009) used the same approach as Castles and Coltheart, but with a control group who were younger. The results showed “much weaker evidence for subtypes of dyslexia” (p. 53). Hulmes and Snowling (2009) are of the opinion that it is best to resign from subtype labeling because this will only describe unstable patterns of reading impairment. Instead the results should be viewed as “continuous variations in the skills that underlie reading development” (p.53).

The French professor Stanislas Dehaene⁷ argues that there is only one basic type of dyslexia and all dyslexic children suffer from a phonological deficit (cited in Castles & Friedmann, 2014). These statements are challenged by Castles & Friedmann (2014) in a more recent article where they claim that there do indeed exist subtypes of dyslexia and not only the phonological and surface type, but several others, e.g. *letter position dyslexia*, *attentional dyslexia*, *developmental neglect dyslexia*, *developmental vowel dyslexia* and *developmental deep dyslexia*, which, according to them, provide evidence for heterogeneity in dyslexia. All in all, there are indeed many-sided opinions on whether dyslexics share the same characteristics, or if they can be divided into subgroups. What seems to be most agreed on is that the support for a marked subtype classification in dyslexia is lacking (Snowling, 2006) and that individual variation in literacy difficulties is a plausible explanation. I tend to agree with Snowling (2006) when she argues that it is not useful to label dyslexics to one or

⁷ Director of the Cognitive Neuroimaging Unit, Professor at the Collège de France, chair of Experimental Cognitive Psychology: <http://www.college-de-france.fr/site/en-stanislas-dehaene/presentation.htm>

the other kind of subtype since there is the possibility that a large group of dyslexic children will be unclassified. All in all, the subtype labeling of dyslexic children is undeniably a much discussed topic, which likely will continue in future research.

1.5 Associated learning differences

Dyslexia often co-occurs with other developmental disorders, such as specific language impairment (SLI), ADHD⁸, dyscalculia⁹ and dyspraxia¹⁰ (Snowling, 2012, Reid, 2007, Kormos & Smith, 2012, Hulme & Snowling, 2009). However, it is important not to assume that a dyslexic child has for instance dyspraxia as co-morbidity just because the child is a bit clumsy. It has been suggested that dyslexics may be clumsier than others, but this is by far not always the case. Similarly, dyslexics may have poor organizational skills, but this does not necessarily mean they have ADHD (Snowling & Stackhouse, 2008). Overall, when making a “diagnosis” of a dyslexic child, caution must be taken so that wrong labeling is not made.

Summary

The history of dyslexia goes back to the late 1890s where doctor reports reveal facts that roughly are similar to what researchers unambiguously claim today. Overall, dyslexia is divided into two, i.e. acquired dyslexia (a result of brain damage) and developmental dyslexia (impaired literacy skills along with other factors such as speech, naming, short-term memory and reading comprehension difficulties).

Extensive research has resulted in several definitions on dyslexia, and even though definitions vary, most agree on that dyslexia is congenital and hereditary. Three main hypotheses have been suggested to explain the causes of dyslexia: the Phonological Deficit Hypothesis, the Magnocellular Deficit Hypothesis and the Cerebellar Deficit Hypothesis. The Phonological Deficit is agreed on to be the core of dyslexia.

There seems to be disagreement about whether there are subtypes of dyslexia or not. Terms like *phonological dyslexia* and *surface dyslexia* are the most discussed, and recently more terms have been added. It has been suggested by several researchers that the differences in dyslexia should be considered as continuous variation in reading development instead of positing different labels to it.

⁸ Hyperactivity disorder

⁹ Mathematical difficulties

¹⁰ Motor coordination difficulties

Dyslexia seems often to co-occur with other developmental disorders such as SLI, ADHD, dyscalculia and dyspraxia.

Chapter 2

Dyslexia in second language acquisition (SLA)

This chapter presents

- **two hypotheses on SLA and dyslexia (2.1, 2.2)**
- **overall challenges in SLA for dyslexic language learners (2.3)**
- **Norwegian dyslexic children learning English as a second language (2.4)**
- **a summary**

Most dyslexic children have difficulties fulfilling foreign language learning requirements (Schneider, 2009, Crombie, 2000, Helland & Kaasa, 2005, Nijakowska, 2008). Many suggestions have been made over the years in order to explain why this is the case, such as poor attitude, high level of anxiety, lack of foreign language aptitude, low motivation and a poor teacher-student relationship (Nijakowska, 2010, Ganschow & Sparks, 2000). However, according to Nijakowska (2010), there has not been conclusive evidence showing “any clear pattern of the relationship between foreign language achievement and cognitive, attitudinal and personality variables” (p. 66). In the next two sections, I discuss two hypotheses which give an account of why foreign language learning is such a challenge for dyslexic students.

2.1 Linguistic Coding Differences Hypothesis

Since the early 80s, two American professors, Sparks and Ganschow (2000) have done pioneering research in regard to dyslexia and difficulties in learning a foreign language. In that period, both being college psychologists had students referred for counseling because of difficulties in the foreign language classroom. Very little research had been performed in regard to dyslexia and foreign language learning at that time and for that reason, Sparks and Ganschow investigated what was researched on dyslexia in native languages and used that knowledge in their work with their students (Sparks *et al.*, 1989, Ganschow & Sparks, 2000). Thus, Sparks and Ganschow developed the so-called *Linguistic Coding Differences Hypothesis* (LCDH), which originates from Vellutino’s work in the 80s (Sparks *et al.*, 1989.) and suggests that foreign language learning is based upon native language skills. Furthermore, the LCDH argues that language learning has three linguistic codes: phonological-orthographic, syntactic and semantic. These codes are the foundation of successful native and foreign language learning and are thus closely related (Miller-Guron & Lundberg, 2000, Nijakowska, 2010, Sparks, 1995, Sparks *et al.*, 1989, Sparks & Ganschow, 2000.).

Especially the first two (phonological-orthographic and syntax) are fundamental to language acquisition at the early stages, whereas the latter (semantics) depends on the conceptual understandings of thoughts and messages expressed through language units (Nijakowska, 2010, Sparks, *et al.* 1989). If there is a problem with one of the codes, e.g. the phonological-orthographic, there will most likely be “a negative effect on both the native language and the FL¹¹ system” (Ganschow *et al.*, 1998: 248). Sparks and Ganschow (1995) connect the Phonological Deficit Hypothesis to the LCDH because the phonological and phonemic awareness skills are central when learning a foreign language as they are in the L1 (see chapter 1). Sparks (1995) states the following: “... poor reading skills in the native language will generalize to poor reading in the FL, further contributing to deficits in listening comprehension, oral expression, reading comprehension, syntax, general knowledge, and verbal memory” (p. 209). Overall, native language skills seem to play a significant role in the failure or success of foreign language learning. Considering dyslexic students who have difficulties in achieving proper writing, spelling and reading levels in their native language, it is highly likely that these students will also struggle in acquiring a second language.

2.2 Orthographic Depth Hypothesis

Another hypothesis that is relevant to mention in order to have an understanding of foreign language learning for dyslexic students is the *Orthographic Depth Hypothesis* (ODH). Nijakowska (2010) gives an account of the ODH, which assumes that “differences in literacy acquisition depend on the orthographic system of a language”. The ODH discusses, as mentioned in chapter 1, the differences between a *shallow* orthography as a transparent, letter-to-sound orthography as in for example Hungarian, Spanish and Italian and more manageable for dyslexic children, and a *deep* orthography which is an inconsistent and unpredictable orthography as for example English, Danish and French, where sounds do not correspond to letters directly and cause severe problems for dyslexics. Nijakowska describes it as follows: “Reliability of the letter-sound mappings is crucial: it seems that the more transparent or shallow the orthography of a given language, the fewer the difficulties encountered by dyslexics learning to read in it..” and she continues: “Opaque, deep, inconsistent orthographies..(..)..tend to pose much more pronounced problems on individuals with dyslexia..” (p. 29). An example of the arbitrariness of the English orthography can for instance be shown by the letter *i* which represents three distinct phonemes as in *Bid* /bId/, *Bird* /bɜ:d/ and *Bide* /baId/ (Reid, Fawcett, Manis, Siegel, 2008: 444). It is the same in Danish, where there for example

¹¹ Foreign language

are five distinct phonemes of the letter *e*: *Sele* /'se:lə/¹²(*shoulder strap*), *Løber* /'lø:bɐ/¹³ (*runner*), *Ven* /vɛn/¹⁴ (*friend*) and *Fed* /'feð/¹⁵ (*fat*) (Mose & Højbjerg, 2013: 10)¹⁶. French has many silent letters and therefore makes a phonemic discrimination almost impossible. In order to understand the differences between the personal pronouns *elle* /ɛl/ (*she*) and *elles* /ɛl/ (*they, feminine*) as well as the verb conjugation *elle parle* /ɛl 'parl/ (*she speaks*) and *elles parlent* /ɛl 'parl/ (*they speak, feminine*), the learner needs to depend on grammatical knowledge and not on sounds since the pronunciation is exactly the same (Miles, 2000). These examples show that it may be quite difficult for dyslexics to learn the English, Danish and French orthography. In addition, Kormos & Kontra (2008) made an interesting study of Hungarian teachers' perceptions of dyslexic language learners of English, and they concluded that "the deep orthography of English was very challenging even for a relatively successful student and that the confusion of similar-sounding words caused serious problems not only in written but also in oral communication" (p. 193).

In sum, the English deep orthography (as well as the Danish and French) is described as a severe problem for dyslexic children. Nevertheless, there seem to be research that does not support this view. There have been examples of a study made by Miller-Guron and Lundberg (2000), which shows that a group of Swedish dyslexic students found it easier to read and write in English than in their native language. The tested students preferred reading and writing in English and performed significantly better than in Swedish and in fact received better grades in this subject. This result is quite remarkable because Swedish has shallow orthography, and should therefore supposedly be easier to process for dyslexics. This phenomenon is called the *Dyslexic Preference for English Reading* (DPER) (Miller-Guron & Lundberg, 2000, Nijakowska, 2010). Different factors have been suggested in order to explain this, e.g. socio-cultural, emotional and neurobiological factors, but one interpretation is orthographical. In short, what is proposed is an alternative technique in decoding the English orthography because of great exposure to the English language (Miller-Guron & Lundberg, 2000).

¹² Long *e*-sound **and** schwa-sound

¹³ *ɐ*-sound

¹⁴ *ɛ*-sound

¹⁵ Short *e*-sound

¹⁶ <http://schwa.dk/lydskrift/dansk-lydskrift>

2.3 Overall challenges in SLA for dyslexic language learners

It is more and more common to introduce English or another European language as a second language as early as in first grade. Considering that the children have not yet reached a fair level of competence in their native language, this may pose an overwhelming burden on the dyslexic children in particular. The consequence may be that young dyslexic learners and others, who are challenged, terminate their language education because the demands are too substantial (Crombie, 2000).

In the Scottish educational system for instance, the reasons described for teaching all students foreign languages early, including the ones with learning difficulties, are to “improve motivation, open up access to culture, foster European identity, enhance understanding of the pupils’ mother tongue, improve cognitive learning, help concentration, be a self-generating process, require little knowledge of a pupils’ own language, initially generate confidence through short-term easily attainable primary objectives and facilitate visits abroad” (Crombie, 2000: 113-114). These are admirable goals and an excellent opportunity for those who are not struggling, but for dyslexic children, who are at risk of failure, it seems safe to predict language learning to be a rather negative and even unbearable experience, especially if the necessary specialized instruction is not offered. Thus, dyslexic students may experience a range of difficulties and challenges when learning a second language such as English. According to Dal (2008), this is due to foreign language learning is a many-sided process which demands several skills to interact with each other, e.g. analytic skills (the ability to analyze linguistic structures such as phonology, syntax, morphology), metacognitive skills (self-correction analysis, see chapter 3) and memory (the ability to store and then evaluate letter-sound combinations, new vocabulary, grammatical structures). Schneider (2009) argues that one of the main factors that make the acquisition of a foreign language problematic for dyslexics is “the nature of the disability itself” (p. 298). This includes problems with “decoding, encoding, and comprehending print at the letter-sound, morpheme (prefixes, roots, suffixes with grammatical or semantic information), and syntax level” (p. 298). As mentioned in chapter 1, what seems to be the cause of the above mentioned difficulties in dyslexics is the differences in the brain’s way of processing literacy tasks and making the information comprehensible (Schneider, 2009, Shaywitz, 2003). In addition, self-confidence plays a significant role in the process of learning a foreign language as well. All in all, the just mentioned impaired skills may hinder or provide severe obstacles for dyslexic students when acquiring a foreign language. However, it is important to keep in mind that dyslexia varies in severity, so dyslexics may have stronger or weaker skills in some

areas than others (Nijakowska, 2010). Next, I provide an overview of the difficulties dyslexic students face in L2 reading, vocabulary learning, writing and spelling as well as speaking and listening.

Reading in L2 is often more difficult than in L1 for dyslexic children (Kormos & Smith, 2012). This is due to orthographic differences which make it difficult for dyslexics to recognize and sequence letters in words (see section 2.2, Reid, 2003). Furthermore, inadequate knowledge of new phonology, morphology and syntax may inhibit word recognition, and this means that text comprehension becomes affected (Schneider, 2009). Dyslexics tend to have smaller vocabularies in L2 compared to their peers (Kormos & Smith, 2012) as well as they often show slower reading speed. Also, they tend to have difficulties in staying focused while reading because they skip lines and guess words (Nijakowska, 2010).

According to Kormos & Smith (2012), dyslexic children often have problems with the acquisition of new vocabulary. A case study was made by Sarkadi (2008) of a 16-year-old student from Hungary learning English as a second language in a mainstream classroom. The focus was on her difficulties in vocabulary learning both written and orally, and on how she used compensatory techniques. The student participated in a four month long study, where she was interviewed three times, fulfilled a questionnaire and had three oral self expression tests including story-telling, summarizing a text and spontaneous conversation in order to provide data on her use of vocabulary in speaking. During the study, Sarkadi, who also was her tutor in the project, kept a log of her difficulties. Furthermore, she investigated the student's notebooks in order to see her compensatory learning strategies. Sarkadi found that the student had problems in grapheme-phoneme correspondences and difficulties in using vocabulary in context. The grapheme-phoneme difficulties were concerned with the irregular English orthography. The student explained that she found it very difficult to learn the spelling and pronunciation of a new English word, and in order to do so, she tried to memorize the spelling through visually processing the word. The most problematic words to learn were those which ended in *-tion* as in *education* as well as long words like *earthquakes* and *health care* (p. 117). However, it is noticeable that it was not only words that were directly linked to the difficult English orthography that caused the Hungarian student problems. Sarkadi found evidence for frequently confusion of similar looking and sounding words. If a new text included two words that looked similar like *caught-cough* or *waist-wrist*, the student would likely mix them up. In regard to vocabulary in context, Sarkadi tested this in oral tests (storytelling, summarizing

and spontaneous conversation) and here the student confused vocabulary with similar pronunciation and orthography as for example *they said George* instead of *they saved George* or *practice the environment* instead of *protect the environment*. Moreover, she added extra sounds as in *dressert* instead of *desert* either because she could not visually retrieve the image of the word, or she could have memorized the misread version of the word (p. 119-120). Overall, this study shows that phonology and orthography are a challenge in language learning for dyslexics.

One of the most complex tasks for dyslexic children in L2 is writing and spelling (Kormos & Smith, 2012). Phonemic, morphological and syntactic awareness skills are all key factors in a writing process. Phonemic awareness is important because words need to be segmented into phonemes and changed into letters, morphological awareness ensures correct spelling of different variants of words and finally, syntactic awareness is essential in order to construct sentences within the boundaries of the rules of writing. As mentioned, these skills are often impaired in dyslexics. Another aspect is the hurdle with getting thoughts written down and organized on paper, which is not an easy part of the writing process for dyslexic students. As a consequence, the text may be non-coherent and of poor quality (Nijakowska, 2010).

Dyslexic students often have their speaking and listening skills affected as well (see chapter 1). In L2 speech production, the student must pay attention to several things like grammar and vocabulary and importantly the phonological aspect of the utterances, i.e. how to pronounce words. This can be slowed down because of the poor short-term memory and furthermore because the L2 is not automatized like the student's L1. The child may have difficulties in finding the right words or names for things and people and simply forget where s/he is in the conversation. Moreover, the dyslexic child may speak unclearly and if not understood, s/he will give up (Kormos & Smith, 2012, Moody¹⁷). The situation is similar with listening and understanding in L2. The main issue is the problem with identifying a foreign language's phonemes and associating them with L2 words. Again the short-term memory can prohibit the dyslexic from remembering the series of sounds and words in the conversation and putting them in the right order. Also, if a teacher speaks fast and gives much information at the same time, the dyslexic student may only understand parts of it and becomes confused as well as avoids answering questions even though s/he may know the answer

¹⁷ Dr Sylvia Moody, www.4dyslexics.com/art050.htm

(Thomson, 2008a). Furthermore, the dyslexic may have problems with understanding and using “socio-pragmatic language concepts such as idiomatic expressions, humour, jokes, homonyms, homographs, homophones or metaphors” (Schneider & Crombie 2003: 6-7, Kormos & Smith 2012).

All in all, it seems to be clear when looking at the above that most dyslexic learners of English struggle with many aspects of the process, and non-dyslexics can only imagine how exhausting and painful it must be. Phonological and orthographic awareness is particularly important when a dyslexic student develops skills in a foreign language. The two described hypotheses provide a good overview of what dyslexic learners are up against namely that, as the LCDH claims, the L2 is based on the L1 skills, and if the last mentioned are insufficient, the L2 will likely be the same. The ODH proves itself repeatedly in different examples when students either learn vocabulary, read or write. It seems safe to say that the deep English orthography makes language learning a battle for learners of English. Next, with the above in mind, I look into what Norwegian dyslexic students face when they meet the requirements of learning English as their second language. I look at some differences and similarities between the two languages in regard to phonology, morphology and syntax in the perspective of my research project described in the second part of this thesis.

2.4 Norwegian dyslexic children learning English as a second language

Norwegian children learn English from Grade 1 and continue till Grade 10. The subject is compulsory and furthermore made one of the basic subjects together with Norwegian and Math (Helland & Abildgaard, 2011). During their first years of instruction, the students only have oral teaching. By Grade 8 the students have both written and oral teaching and in addition, they have exams with grades (Helland & Kaasa, 2005, Helland, 2008). In an international rating of English as a second language (Alabau *et al.*, 2002), Norwegian students received top scores, which is most likely because of a high amount of mass media influence, such as the internet, computer games, television, music and non-dubbed movies. Thus, it appears that the acquisition of English in naturalistic settings in Norway is quite good. Unfortunately, dyslexic students often do not attain the same top level (Helland, 2008). The Norwegian students’ main issue is the English deep orthography, which can be observed in their reading, spelling and text comprehension (Helland, 2008). According to Helland & Kaasa, 2005), “Norwegian has a “fairly regular orthography

implying that in most cases the reader may access the script through a phonematic approach..” (p. 43) and therefore it is a particular challenge for Norwegians dyslexics to switch to English.

2.4.1 Phonology

Norwegian has 40 phonemes and English has 44. Norwegian lacks certain phonemes that English has, i.e. /θ/ (*thought* /'θɒt/), /ð/ (*that* /'ðæt/), /ʒ/ (*pleasure* /'pleʒə/) and /w/ (*we* /'wi/). Moreover, English contains more diphthongs than Norwegian. English has eight diphthongs and Norwegian has five. The eight English diphthongs are as follows: /ɪə/ (*year* /'jɪə/), /eɪ/ (*they* /'ðeɪ/), /ʊə/ (*pure* /'pʊə/), /ɔɪ/ (*boy* /'bɔɪ/), /əʊ/ (*no* /'nəʊ/), /eə/ (*chair* /'tʃeə/) and /aɪ/ (*I* /'aɪ/). Some of the Norwegian diphthongs resemble the English ones, i.e. /ai/ (*hai*: /hai/, English: *hi*), /æi/ (*hei*: /hæi/, English: *hey*) and /ɔy/ (*koie* /kɔyə/, English: *boy*). Others are /øy/ (*øye*: /øyə/) and /æʌ/ (*sau* /sæʌ/) (Skaug, 2005: 70-77, Helland & Kaasa, 2005). Thus, what Norwegian children typically struggle with are the sounds that do not exist in Norwegian. As an example, Norwegians may mix up sounds like /ð/ (*th*) and /d/, e.g. *there* may instead be pronounced *dare* and thus change the meaning as in sentence (5). Sentence (6) provides an example of another mix-up of sounds and consequently a change of meaning, e.g. /θ/ (*th*) and /t/ (Skaug, 2005: 111):

(5) *There you go!* – *Dare you go?*

(6) *My love is through!* – *My love is true!*

2.4.2 Morphology

Norwegian resembles English in morphology, but there are also some differences. Norwegian verbs are not marked by person and number agreement as in English but both languages mark tense (Hasselgård *et al.*, 2012). Sentence (7) provides an example of the Norwegian structure which has no verb inflection to show if the subject is singular or plural. Sentence (8) shows the English structure with person and number agreement (marking of 3rd person singular –s and no marking in plural). What seems to be a typical error made by Norwegian learners is the marking of 3rd person singular –s.

(7) *Han går en tur - De går en tur*

(8) *He take-s a walk - They take a walk.*

2.4.3 Syntax

English and Norwegian generally have the same word order structure in declarative sentences which is S-V as illustrated in sentence (9) as well as in V-S (subject-verbal inversion) where the sentence becomes interrogative. Only English auxiliaries can invert with the subject whereas in Norwegian any verb can. The auxiliary *do* is obligatory in interrogative and negative sentences if there are no other auxiliaries present. The auxiliary provides information of the tense of the verb phrase. When *do* functions as an auxiliary, the term used for it is *do*-support (Dypedahl, Hasselgård & Løken, 2012, Hasselgård *et al.*, 2012). Other auxiliaries can be negated, e.g. *would*, but then *would* is used in combination with *not*. So, here is *do*-support not needed. *Do*-support is a particular challenge for any learner of English. Norwegian uses the negation *ikke* and/or *nej* in yes/no questions (Moen & Pedesen, 2003). Sentence (10) is an example of an English interrogative sentence with *do*-support opposite a Norwegian sentence with inversion. Sentence (11) illustrates negation with *do*-support where the Norwegian sentence uses *ikke*:

(9) *He handed in his thesis on time. – Han leverte inn avhandlingen sin i tide.*

(10) *Did you hand in your thesis on time? - Leverte du inn avhandlingen din i tide?*

(11) *He didn't hand in his thesis on time – Han leverte ikke inn avhandlingen sin i tide.*

Norwegian finite verbs are *always* required to be in second position in main clauses. This phenomenon is called *Verb second* (V2) (Hasselgård *et al.*, 2012m). In a sentence where an adverbial takes up the initial position, the English rule is that the S-V order remains, but in Norwegian the verb moves to second position. Sentence (13) is an example of this:

(13) *Yesterday a man got lost in the woods – I går gikk en mann seg vill i skogen.*

Most Norwegian learners of English are challenged in learning the just described grammatical structures. However, the dyslexic students are more challenged than non-dyslexics. This is due to the specific problems with phonological-orthographical awareness and short-term memory problems which prohibit the students in analyzing linguistic structures as phonology, syntax and morphology (see section 2.3 and chapter 1). Also, dyslexics tend to have a low self-esteem and tend to be confused more easily than non-dyslexics which also can have an impact on learning grammatical structures. In the next chapter, I give an account of the principles of the dyslexia

friendly schools in Norway. Furthermore, I look into the stimulation and teaching strategies that have been proven effective for dyslexic and non-dyslexics, as well as I describe how dyslexic students prepare for and pass tests at school.

Summary

The Linguistic Coding Deficit Hypothesis and the Orthographic Depths Hypothesis are both presenting an explanation to why dyslexic children seem to find the acquisition of English as a second language very troublesome. Research shows that foreign language learning is built upon native language skills, and so dyslexic children find foreign language learning very hard. The difficulties seem to have their roots in the impaired phonological and orthographic awareness skills. There are remarkable studies which show the opposite, i.e. a group of Swedish students finding English as their second language easier to cope with than their native language despite its shallow orthography. This may be explained by the massive exposure to mass media.

The overall difficulties that dyslexic children struggle with in L2 are reading, writing, vocabulary learning as well as speaking and listening. This is due to impaired analytic skills (ability to analyze linguistic structures), metacognitive skills (ability to make self-corrections) and memory skills (ability to store, e.g. new vocabulary and grammatical structures).

Learning English as a second language for Norwegian dyslexics often is a burdensome experience because of the difference in orthographies and grammatical structures. Even though Norwegian students have scored top results in an international rating of second language acquisition due to the influence of the mass media, dyslexic students do not obtain the same results.

Chapter 3

Dyslexia friendly schools in Norway

This chapter presents

- **the principles of dyslexia friendly schools in Norway (3.1)**
- **stimulation and teaching methods – the Multisensory Learning Approach (MSLA) and metacognition (3.2)**
- **how dyslexics pass tests in school (3.3)**
- **a summary**

3.1 The principles of dyslexia friendly schools in Norway

Inspired by the British Dyslexia Association, the Norwegian dyslexia organization *Dysleksi Norge*¹⁸ established the project *Dyslexia Friendly schools* in 2005 with a focus on an inclusive and accepting environment for children with dyslexia. The project has evolved gradually, and today there are 28 dyslexia friendly schools in Norway, divided between Primary, Secondary and High school. To become dyslexia friendly, schools must apply to *Dysleksi Norge* and pass 10 criteria. These are:

1. The school administration and staff have discussed and agreed that their particular school has the goal of becoming dyslexia friendly. The application to *Dysleksi Norge* is debated and put into the corporate plan.
2. The school ensures an enhancement of competences of the staff in the areas of reading and writing difficulties as well as computer aid programs. Teachers must complete a specialized web-based course on dyslexia.
3. The school has a wide range of teaching material, thus, all students have access to all possible scholarly literature (software and assistive technology for all students: audio books and scanning programs)
4. The school works actively towards a favorable and positive learning environment by the use of approved learning programs.
5. The school has implemented a routine in mapping the students' progress or lack of progress.

¹⁸ <http://www.dysleksinorge.no/>

6. The school makes use of special procedures if a student lags behind in his/her reading and writing development.
7. The school operates through effective and specialized dyslexia friendly methods to ensure
 - comprehension
 - good reading and learning strategies
 - effective routines in the evaluation of the learning process
 - the use of multisensory learning (which I discuss more thoroughly later in this chapter)
 - a good structure in all tutoring at the school
 - efficient homework agreements and open communication with parents
8. When the dyslexic students have tests, they are provided with different kinds of aids (e.g. the computer reads aloud, more time to complete the test than the non-dyslexic students) in order to be able to show their abilities. Also, the school supports the students who need to be exempted from tests all together.
9. All staff members wish to make all students feel understood and respected independently of which level the students have and which grades they have obtained. The school is required to document good routines in student-teacher meetings as well as plans against bullying.
10. The school guarantees open communication with parents concerning their child's study plan and progress

(Translated by the author from: Solem, 2015, p. 106-107)

Furthermore, since 2010, teachers have been offered a course on dyscalculia, speech difficulties and how to use dyslexia computer programs. A very positive expansion is in regard to kindergarten teachers who are also offered courses in how to spot children at-risk for having dyslexia. All in all, the dyslexia friendly schools are required to work systematically towards the goal of keeping all students on track.

Looking at the study plan for the Norwegian dyslexia friendly school, Solneset skole¹⁹, I am pleased to observe that the focus on the just described criteria is indeed specified and prioritized. This particular school became dyslexia friendly in 2013 and is a school where the staff constantly works on improving their attitude towards dyslexia. A school brochure gives a good overview of their goals (see Appendix A) as does their web site where their study plan (*leseplan*) is thoroughly

¹⁹ <http://solneset.tromsokolen.no/>

described. The key words in the study plan are: phonological awareness (*fonologisk bevissthet*), decoding (*ordavkoding*), flow in reading (*leseflyt*), reading comprehension (*leseforståelse*) and very importantly, enjoyment of reading (*leselyst*). All is in agreement with the specific, above mentioned criteria from *Dysleksi Norge*. What is also prominent is the focus on *metacognition* which is the reflection of the student's own reading comprehension, learning and effort in an open dialogue with teachers (see section 3.2).

It seems like the dyslexia friendly schools provide a learning environment that is open, inclusive and structured. As an example, the brochure from Solneset skole (Appendix A: 4-7) describe how a visual schedule of the day's program is lined up in the class rooms and provides information for the dyslexic students (as well as all students) of what to expect of the day. If other kinds of information are written down on the classroom board, these are colour-coded, so the dyslexic students have a better over-view and will remember the information better. Furthermore, the dyslexic students sit close to the teacher and next to motivated students who can help with repeating instructions from the teacher. Also, the teachers instruct the students in group work, as well as they set up rules for discussions. Group work is mostly in small groups of three to six students, which may invite the dyslexics to participate in discussions instead of keeping quiet. All in all, these factors may likely play a role in how the students express themselves without feeling "stupid" and embarrassed and simply make the dyslexic students feel safer and more confident.

In 2012, *Dysleksi Norge* started a project concerning adjusted learning in English for dyslexic students called "I want to participate!". It is a web based course in English for both language teachers and students at all levels (Primary, Middle and High school). The reason for developing the project was due to many inquiries from schools and parents about what they should do with their dyslexic children in the foreign language classroom. Also, *Dysleksi Norge* has a partnership with the *Helen Arkell Dyslexia Centre*²⁰ in England which has passed their experience in teaching children with dyslexia on to the Norwegian dyslexia friendly schools, in particular the Multisensory Learning Approach. Moreover, *Dysleksi Norge* has an agreement with the *Helen Arkell Dyslexia Centre* to send a group of Norwegian students to their centre twice a year and a group of teachers once a year to participate in the tutoring. All in all, what *Dysleksi Norge* wants to accomplish is to show that adjusted learning is the best way of learning for students with different degrees of

²⁰ <https://www.helenarkell.org.uk/>

dyslexia. This means that focus especially are on: phonology, structured and direct teaching using multisensory learning and computer assistance. In the next section, I describe recommended teaching methods and stimulation for dyslexic students.

3.2 Stimulation and teaching methods – the Multisensory Learning Approach (MSLA) and metacognition

It seems obvious that the sooner children with dyslexia and at-risk for having dyslexia are identified the better because early intervention can help to improve the outcome of the reading and spelling process. It may indeed have a significant negative impact if the children are not diagnosed and do not receive the proper and specialized help they need (Shaywitz, 2003). The reading researcher at Florida State University, Director Emeritus, Joseph Torgesen²¹ has expressed it as follows:

“To the extent that we allow children to fall seriously behind at any point during early elementary school, we are moving to a “remedial” rather than a “preventive” model of intervention. Once children fall behind in the growth of critical word reading skills, it may require very intensive interventions to bring them back up to adequate levels of reading accuracy, and reading fluency may be even more difficult to restore because of the large amount of reading practice that is lost by children each month and year that they remain poor readers”. (Shaywitz, 2003: 121)

Thus, as soon as a child has been identified as being dyslexic or at-risk for dyslexia, the next thing to do is to give systematic intervention that will help and most likely improve the phonological awareness and hereby the poor reading skills. Currently, there are many intervention programs that have been empirically validated in training studies over the past 40 years (Muter, 2005). According to Snowling (2012) there is unfortunately some who think they can cure dyslexia and use programs that have “no proper evidence base” (p. 6). Therefore, it is important that professionals critically view what these programs contain to ensure that the children only receive the best suited programs. Snowling and Hulmes (Snowling, 2012), did a thorough review of different evidence-based intervention programs in children with language and literacy difficulties. What was concluded was that the programs need to be systematic, structured and multisensory as well as having direct teaching with frequent revision just as Orton predicted (Henry, 1998). What needs to be focused on in the intervention is phoneme awareness training and thus the practice of linking letters and

²¹ <https://psy.fsu.edu/faculty/torgesen.dp.html>

phonemes in writing and reading tasks on the correct level that the child is on. As an example, in a study carried out on 35 Danish kindergarten children concerning long-term effects of phoneme awareness and letter sound training in children at risk for dyslexia, Elbro and Petersen (2004) found that phoneme awareness training indeed has positive long-term effects. The children entered the study as kindergarten children and were seen again in a follow-up study in the 1st, 2nd, 3rd and 7th grade. There were three groups; the experimental, trained at-risk group, the untrained at-risk control group and finally the not at-risk control group. They were tested in; letter naming, word decoding, phoneme deletion, picture naming speed, phoneme discrimination, syllable deletion, pronunciation accuracy and short-term memory. The results showed that “...the trained children outperformed 47 untrained at-risk controls in both word and non-word reading in Grades 2, 3 and 7. For the very poorest readers, significant effects were found – even in Grade 7 reading comprehension. But, “the trained at-risk children were found to lag behind a control group of 41 not-at-risk children in most aspects of reading” (p. 660). The long term effects of the phoneme awareness training were proven because the children showed “significant effects even 7 years after the completion of the training” (p. 667). In sum, the evidence based intervention programs for dyslexics and at-risk children are crucial.

Earlier I mentioned the Multisensory Learning Approach (MSLA) as one of the criteria a dyslexia friendly school is required to apply. This approach has been proven very effective in regard to teaching dyslexics in reading and spelling in both native and foreign language learning (Nijakowska, 2010). In fact, the National Institute of Child Health and Human Development support much of the research done in supporting young dyslexic children in explicit structured language teaching like the MSLA (The International Dyslexia Association, Fact sheet #69-01/00).²² The basic principles of the MSLA are simultaneous activation of the human’s different senses as in the visual (what a letter/word looks like), auditory (what it sounds like) and tactile and kinesthetic (how arm, hand and speech organs feel when producing it). In other words, a letter or a word is seen, heard and felt (Nijakowska, 2010). The MSLA was, as described in chapter 1, originally based on Samuel T. Orton’s pioneering work in the early 1900s. Later he became partners with his colleague Anna Gillingham, and together they made what is known as the *Orton-Gillingham Methodology* (later in 1960; *Gillingham-Stillman*). They basically designed a language research project in the beginning of the 1930s and started their work on children with specific reading

²² <http://www.dys-add.com/resources/Myths/IDA.OG.Fact.Sheet.pdf>

difficulties using the visual, auditory and kinaesthetic-tactile senses (Henry, 1998). According to Henry (1998), what is known today of children and dyslexia is all facts predicted by Orton from back then, also difficulties in foreign language learning:

“Orton became convinced that dyslexia(...)... was a problem of language, a “specific reading disability”, a phrase he used in 1928. He noted that 50 percent of his patients not only had reading difficulties, but also related language disorders including problems with receptive and expressive language, passage comprehension, spelling, and composition. He later concluded that “... in a considerable proportion of cases of the reading disability there is evidence of difficulty acquiring other functions..., for example, disorders in speech, special disability in spelling, special disability in writing, failure to acquire skilled movements with normal ease and accuracy, difficulty in learning foreign languages...”.” (Henry, 1998: 6)

Kormos & Smith (2012: 126) describe it as follows: “The Orton-Gillingham (OG) approach ... (...) gives children explicit and direct teaching in sound-letter correspondences and activates different sensory channels simultaneously”. The former President of the Orton Dyslexia Society, Margaret Byrd Rawson has expressed it in the following way:

“Dyslexic students need a different approach to learning language from that employed in most classrooms. They need to be taught, slowly and thoroughly, the basic elements of their language -- the sounds and the letters which represent them -- and how to put these together and take them apart. They have to have lots of practice in having their writing hands, eyes, ears, and voices working together for the conscious organization and retention of their learning.” (The International Dyslexia Association, Fact sheet #69-01/00)

According to The International Dyslexia Association (IDA), the content of what needs to be taught using the MSLA is: phonological awareness, sound-symbol association, syllable instruction, morphology, syntax and semantics. Nijakowska (2010) has constructed *Sample Activities for Learners with Dyslexia Learning English as a Foreign Language*, which are activities respectively in developing phonological, orthographic, morphological and grammatical awareness. In practice, this involves colored flash cards and pictures, board games, plastic models of letters, drama and role play, digital voice recorders, speech-to-text software, songs, a finger-tapping strategy (which assists

the spelling of a word while tapping a finger down on a table or inside the hand palm, sound by sound in each syllable) and many other activities. According to Schneider & Crombie (2003), if a linguistic concept is hard to memorize for a dyslexic learner visually or aurally, it is possible by the sense of *touch-memory* and *muscle memory*. A study was done by Ganschow *et al.* (1998) and Ganschow & Sparks (1995), which showed that adaptation of the MSLA in teaching foreign languages, learners at risk of having dyslexia resulted in “improvement of both the oral and written aspects of the student’s native language performance as well as foreign language aptitude”. Studies by Ganschow & Sparks (1995) and Sparks *et al.* (1992b) have also shown that students with “FLL difficulties, who receive direct multisensory instruction in the phonology/orthography of a foreign language make significant gains and maintain them over time” (Nijakowska, 2010: 128). In sum, the MSLA has been proven very effective in regard to teaching dyslexic students foreign languages in regard to ameliorate memory and learning because they have the opportunity to use multiple senses.

Like the MSLA, *metacognition* has been proven very useful in learning situations (Wearmouth & Reid, 2002). According to Nijakowska (2010), this is due to “students with dyslexia quite often insufficiently realize their own thinking and reasoning processes and find it troublesome to control them” (p.127). Kormos & Smith (2012) and Schneider & Crombie (2003) state that *metacognitive strategies* can be translated into “about thinking strategies” and is a kind of problem-solving and self-correcting strategy. Schneider and Crombie (2003) also call metacognitive strategies for *metalinguistic thinking* because this kind of thinking naturally has to do with language, but like Nijakowska (2010) I will use the phrase metacognition. Thus, a foreign language teacher needs to involve their students in reflecting about language related issues and in finding a way to solve a certain linguistic problem. It could for example concern a spelling mistake, whether to choose the indefinite article *a/an* or the definite article *the* before a noun phrase or whether or not a noun is countable or uncountable (Kormos & Smith, 2012), and this is done by asking so called *thought-provoking* questions by the teacher that ultimately will lead to the correct answer (Schneider & Crombie, 2003). Such a question could for example be “what are you thinking?”, “where would you insert this word?” or “can you see the pattern?” (Nijakowska, 2010: 150). Moreover, the use of supportive and encouraging answers like for example “good thinking” and “great idea” are extremely valuable in continuing the metacognitive thinking instead of a negative statement like “bad choice” (Schneider & Crombie, 2003: 28-29). Researchers (Schneider & Crombie, 2003, Schneider & Ganschow, 2000, Kormos & Smith, 2012) all agree on and encourage metacognitive

skills to be developed in dyslexic students. It is very important that these students can reflect about the nature of their learning. Schneider and Crombie (2003) recommend that the learner uses the *inner-self correction dialogue* which can be more or less spoken out loud, so the teacher can assist the process in for example: “Have I come across this situation before?” or “How did I resolve it last time” (Kormos & Smith, 2012: 121-122). According to Schneider & Crombie (2003), the metacognition skills and reasoning processes can be helped successfully through the MSLA because it gives the students an opportunity to use “their strengths to compensate for auditory and or visual weaknesses” (p. 26). In sum, research-based teaching methods and stimulation of dyslexic students are very important in order to ensure motivation and improvement. In the next section, I describe what passing tests at school means for dyslexic students.

3.3 How dyslexics pass tests in school

As most students around the globe, dyslexics are required to prepare and pass tests in the foreign language class room in order to be able to have a successful career in the future. It seems safe to say that this task is stressful and scary for them combined with the feeling of low self-esteem. Dyslexic children do not want to be different from their peers, so when special arrangements are made to support their special needs in a test situation, they might often reject them (Schneider & Crombie, 2003, Thomson, 2008b).

According to Schneider and Crombie (2003), what dyslexic students need in order to receive good test results are four things: “explicit instruction of test preparation strategies, explicit instruction of test-taking strategies, careful selection of test tasks and appropriate test-taking modifications” (p. 58). Not only will dyslexic students benefit from the above mentioned preparation and test-taking strategies, there is a good chance that *all* students will. The above mentioned MSLA as well as metacognition are important tools in test preparation because these approaches improve the memorization of phonology, grammar and vocabulary among other things. A multisensory strategy could for instance be the use of *mnemonic devices*²³ which is a very effective way of remembering difficult and a large amount of information. Using this strategy can also be helpful in the student’s native language. Also, the use of laminated color-coded flash cards to review and practice what is learned in class is an example of an explicit way of supporting students before a test. If a student is to prepare for an oral exam, the foreign language teacher can provide a so-called *mock exam*. This means that the teacher invites the student for a five - ten minute session (individually or in small

²³ Mnemonic devices are for instance rhymes, alliterations or acronyms

groups) where they can practice for the test together. This is of great benefit for a dyslexic student who is often afraid of being called on in class to answer questions or read something aloud in front of everybody. At the actual test-taking situation (exam), the dyslexic student will benefit from knowing that s/he is allowed to ask the teacher for support. This does not mean that the teacher can provide the correct answer, but rather asking metacognitive questions, so the student hopefully will get back on track (Schneider & Crombie, 2003). Needless to say, the use of a computer to read out loud and assist with spelling is of great importance (Thomson, 2008). In sum, preparing for test situations as well as the testing itself are challenging and often frightening for dyslexic students, but with the correct, explicit help in preparing, it does not have to be an impossible task.

Summary

In order to be approved as a dyslexia friendly school, the school applying must pass certain criteria set by the Norwegian dyslexia association *Dysleksi Norge*. These criteria are within the area of how schools best ensure good reading- and learning strategies for the students, e.g. multisensory learning, evaluation of the teachers, efficient homework plans and open communication with the home of the students. Also, an ongoing evaluation of the students takes place on a regular basis, and adjustments of the students' reading- and study programs can be adjusted if needed. Also, *Dysleksi Norge* has international relations with a dyslexia centre in Great Britain, which provides help and expertise on how to teach dyslexic children.

The sooner dyslexic children and children at risk for having dyslexia are identified the better. An approach that is indeed acknowledged as being a very good tool for dyslexics is the multisensory learning approach, where multiple senses are used. This approach has also been shown to improve metacognitive skills.

Taking tests is usually a frustrating and scary challenge for dyslexic students. However, with good preparation and test taking strategies, e.g. the use of multisensory and metacognition tools as well as having good support from teachers, there is a good chance that the students may manage the testing without feeling too discouraged and maybe with good results.

Chapter 4
The research project:
6th and 7th grade students at dyslexia friendly schools in Norway
and
The English 2 Dyslexia Test

This chapter presents

- **the purpose of the research project (4.1)**
- **the method (4.2)**
 - **official permissions (4.2.1)**
 - **test battery (4.2.2)**
 - **participants (4.2.3)**
 - **procedure (4.2.4)**
 - **a summary**

4.1 Purpose of the research project

Considering the previous chapter, it seems likely that Norwegian dyslexia friendly schools have a positive impact on dyslexic and non-dyslexic students alike. To the best of my knowledge, there has not been carried out any research concerning the effect of Norwegian dyslexia friendly schools on foreign language learning to this date. Thus, with this research project I seek to add valuable knowledge to this particular field.

The present research project has one main and one secondary objective:

The main objective is to investigate whether Norwegian dyslexia friendly schools have a positive effect on dyslexic students learning English as a second language compared to dyslexic students at non-dyslexia friendly schools in Norway. For this purpose, I use the *English 2 Dyslexia Test* (described in section 4.2.2). This test has seven subtests and focuses on specific areas of language acquisition which seem to cause dyslexic students problems, mentioned in chapter 2. These are:

- text comprehension (*L2 comprehension*)
- oral production (*Model sentences, Daily conversation and Picture story*)
- syntax, morphology and semantics (tested within the *Model sentences* test)
- literacy, i.e. spelling, reading and translation (*Single word dictation, Sentence reading and Sentence translation*)

I carry out a comparison between a group of eight recently tested (by the author) dyslexic students from 6th and 7th grade at four different Norwegian dyslexia friendly schools and a group of 20 dyslexic students in a former study (Helland & Kaasa, 2005). Helland and Kaasa (2005) tested 20 dyslexic students from 6th and 7th grade from six different non-dyslexia friendly schools in Norway and compared them to 20 non-dyslexic students by the use of the *English 2 Dyslexia Test*. My main focus will be on the comparison between the two groups of dyslexics, i.e. the 2016 dyslexic group and the 2005 dyslexic group. I acknowledge that the present study only has eight dyslexic students, where Helland & Kaasa have 20. Therefore, the results must be regarded as tentative.

Helland has previously carried out dyslexia studies in L1 (Asbjørnsen, Helland, Boliek & Obrzut, 2004, Helland & Asbjørnsen, 2000, 2003) and used a language comprehension test. Here, she and her colleagues found variation within the dyslexic groups: some of the students had good comprehension skills, some had poor. The groups in the different studies who scored poorly on the comprehension test showed difficulties in tasks involving “short-term memory, working memory, rapid naming, reading and spelling” (Helland and Kaasa, 2005: 44) compared to the groups who did not perform poorly. Due to these findings, Helland and Kaasa (2005) decided to do the same and divide their dyslexic group into two subgroups, i.e. C+ (non impaired comprehension) and C- (impaired comprehension) by the median in the L2 comprehension test in the test battery *English 2 Dyslexia Test*. The median is the mathematical term that describes the number that divides the higher half from the lower half of a dataset. The problem of using the median as the criterion for C+ (higher half) and C- (lower half) is that the median may be different from dataset to dataset in other comparable studies. As an example:

EX: Dataset A (n=8): 4, 5, 5, **6, 7**, 8, 9, 9. Median = 6,5 (**6+7**: 2). C + = 7, 8, 9, 9 and C - = 4, 5, 5, 6.

EX: Dataset B (n=8): 7, 8, 9, **9, 10**, 12, 13, 13 Median = 9,5 (**9+10**: 2). C + 11, 12, 13, 13 and C - = 7, 8, 9, 9.

Both datasets here are divided into C + and C - by the median. The test score C + in dataset A has the same test score as C - in dataset B. Thus, the median is not a valid method to classify a test result in L2 comprehension test as C + or C -. To have a valid reproducible classification, the minimum score in L2 comprehension that is required to be C + has to be defined and thereby be a possible diagnostic test for impaired comprehension. Using the median is a weakness in the comparison of results in different studies using the test. However, I divide the eight tested students

in my research project in the same way as Helland and Kaasa (2005). The reason for this is that the median in my dataset is 10.5 and hereby comparable to the median in Helland and Kaasas (2005) study which is 10.0. All in all, I find it plausible to compare the results from 2005 and 2016.

The secondary objective is to investigate the effect on the non-dyslexic students at the dyslexia friendly schools in L2 English. Therefore, I performed a testing on 15 non-dyslexic students who act control group in this research project. I carry out the following comparisons:

- the control group at the dyslexia friendly schools (2016) with the control group at the non-dyslexia friendly schools (2005).
- the results 2016 dyslexic vs. control group with the results 2005 dyslexic vs. control group.

Having the literature in the first part of this thesis in mind as well as the objectives as described here, I have the following three hypotheses:

1) Main objective: I predict that there is a measurable positive effect on the dyslexic students' performances at the dyslexia friendly schools compared to the dyslexic students at the non-dyslexia friendly schools (2005) in the *English 2 Dyslexia test* in certain areas. These areas are in reading and translation. The reason for this is that the dyslexia friendly schools have a specific focus on improving literacy skills by the use of multisensory learning and metacognitive strategies as well as structured teaching (see chapter 3). Another area I predict a significant result is in the oral production tests due to the dyslexia friendly tutoring which make the students better at communicating, but also because the dyslexia friendly schools seem to provide an open and inclusive environment, which invite the students to participate orally in the classrooms (see chapter 3). Nevertheless, dyslexics do tend to have difficulties in speaking and listening (see chapter 2) and in English class, they often have difficulties in structuring new phonology, grammar and vocabulary in their utterances and may therefore often freeze if put on the spot. Furthermore, dyslexics tend to become confused more easily, and their short-term memory may prohibit them from remembering where they are in a conversation. An area where I predict no improvement between groups is in spelling. Spelling is a skill where dyslexics most often have persistent and severe difficulties (Shaywitz, 2003) due to poor phonological-orthographical, morphological and syntactic awareness (see chapter 1 and 2). These awareness skills are important when a sentence is constructed and written down. In addition, the Model sentences test evaluates the linguistic skills in morphology,

syntax and semantics, where morphology likely is the most challenging. The lack of verb inflections in Norwegian compared to the 3rd person singular –s inflection in English is an example of such a challenge for Norwegian learners. Overall, the just described issues are difficult for most Norwegian learners of English, but due to the specific problems with phonological-orthographical awareness, memory, vocabulary and grammatical structures which dyslexics often have, these students are more challenged than non-dyslexics.

2) Secondary objective: I predict that there is a measurable positive effect on the non-dyslexic students' performances at the dyslexia friendly schools in the *English 2 Dyslexia test* compared to the non-dyslexic students at the non-dyslexia friendly schools in more or less all areas of the testing. It has been indicated by several researchers (Nijakowska, 2010, Kormos & Smith, 2012, Ritchey & Goeke, 2006) that non-dyslexics also benefit from structured, dyslexia friendly teaching methods. Thus, I expect improvement for the non-dyslexic students at the dyslexia friendly schools over a broad spectrum, particularly in reading (as the dyslexic students) because of the strong focus on reading improvement, as described in chapter 3. The oral testing should also show a positive result compared to the 2005 study because of the focused teaching and the inclusive environment. Spelling in English, on the other hand, is a difficult task for many language learners because of the mentioned opaque English orthography (chapter 2), so the data may show a non-significant result in this area but not a poorer result than the 2005.

3) Secondary objective: I predict, in the comparison of the results of the 2016 dyslexic group vs. the control group with the results of the 2005 dyslexic group vs. the control group, that in 2016, the control group outperforms the dyslexic group on all tests. The reason for this is first of all based on the same result from Helland and Kaasa's study (2005) (see chapter 5). Secondly, the test battery used in this project examines skills which dyslexics typically have difficulties with and thus perform lower than controls with normal skills. Besides, to my knowledge, there has not been research showing higher scores on dyslexics as opposed to non-dyslexics in this kind of testing. Based on the results in Helland and Kaasas study, my predictions for the results in the 2016 control group vs. the subgroups (C+ and C-) as well as within the subgroups are as follows:

- the control group will perform significantly higher on the literacy tests (Spelling, Reading, Translation) compared to C+ but not on the remaining tests.
- the control group will score significantly higher on all tests compared to the C- group.

- the C+ group outperforms the C- group in all tests except for spelling.

In sum, my predictions are as follows:

1) There is a measurable significant effect on the dyslexic students' performances at the dyslexia friendly schools compared to 2005 in reading, translation and oral testing. However, we will probably not see an improvement in spelling or in the additional scores in morphology, syntax and semantics (in the Model sentences test), and morphology will be the most challenging task.

2) There is a measurable positive effect on the non-dyslexic students' performances from the dyslexia friendly schools in all areas of the test, particularly in reading and in oral production. Spelling will not show improvement.

3) Based on the same result from Helland and Kaasa's study (2005), the 2016 control group outperforms the dyslexic group on all tasks. The 2016 control group will perform significantly higher than C+ on the literacy tests but not on the remaining test. The 2016 control group will score significantly higher on all tests compared to the C- group. Within the subgroups, the C+ group will score significantly higher than C- on all tasks.

4.2. Method

In this section I briefly present the official permissions obtained in order to carry out the research project. Second, I describe the content and procedure of the test battery *The English 2 Dyslexia Test*. Third, I introduce the students who participated in the project. Fourth, I explain the procedure of the testing.

4.2.1 Official permissions

The project was approved by the Norwegian Social Science Data Services in November 2015 (Appendix B). A group of dyslexic and non-dyslexic students were invited to be tested. The class teachers contacted the parents of the students who wished to participate in order to get a signed parental consent (Appendix C). Then, I made arrangements with the teachers to begin the process of testing the students.

4.2.2 The test battery

The test used in this research project is *The English 2 Dyslexia Test* designed and produced in 2004 by Cand. san. Randi Kaasa, Cand.philol. Signe Marie Sanne and Dr. polit., Professor Turid Helland. The number 2 indicates 2nd language (as in L2) and as a homonym for *too* implying *English too, don't forget* (Helland, 2008). Helland and Kaasa were responsible for selecting test type including construction of sentences and pictures, and Sanne was in charge of the computer program, i.e. instructional design, graphic design, programming, editing of the picture and audio sound files, organization and distribution concerning the proper use on the Internet and on CD. Also, Sanne managed the composition of the statistic diagrams and web page (www.vesttest.no).

The test is based on a former pen and paper-based test made by Kaasa (2001). Later it became a computer-based program. The test was made for dyslexic Norwegian students in the 6th and 7th grade in order to evaluate their basic proficiency in English and to mark the transition between Primary school (1st-7th grade) and Middle school (8th-10th grade). Furthermore, the test could be a helpful tool in the making and preparation of intervention programs suited for dyslexics. In addition, there were no assessment tools available for the testing of dyslexic students in neither of the Scandinavian countries, and so the researchers decided to create a test for this purpose (Helland, 2008). Helland and Kaasa (2005) considered the following essential principles for a plausible test:

“[the] contrasts between L1 and L2 with regard to language typology and orthography, typical symptoms of dyslexia in L1, typical symptoms of dyslexia in L2, essential components of a language test, and essential components of a dyslexia test. In addition, it has to demonstrate both assets and deficits in the skills being tested, and it has to meet standards of reliability and validity”. (Helland, 2008: 66)

The test consists of an oral and a written part and a total of seven subtests. The oral part is scored in relation to production and comprehension with different linguistic components, i.e. phonology, morphology, semantics, pragmatics and syntax. The written part is scored in regard to literacy skills, i.e. spelling and reading. The authors of the test include translation as a literacy skill. This part also exposes the students to orthographical differences and similarities between English and Norwegian. Because of the short-term memory difficulties that dyslexics often experience, the assignments cannot be too long and complicated with many unfamiliar words (Helland & Kaasa,

2005). The students are in need of a head phone with a microphone in order to record their answers for the oral parts. The testing of each student lasts approximately 45-50 minutes, and the test leader uses around an hour to evaluate the results. The test scoring principles are quantitative, ending up with a graphic profile of the results (see figure 1) (Helland, 2008).

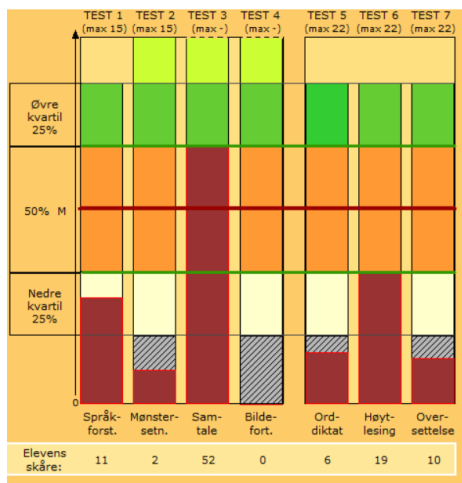


Figure 1

The seven tasks are as mentioned: *L2 comprehension*, *Model sentences*, *Oral production*, *Functional language use*, *Single word dictation*, *Sentence reading* and *Sentence translation*. Before each test, the student receives an instruction from the test leader of what each task will contain and how to approach it.

Test one - L2 comprehension:

The purpose of this first test is to investigate the student's language comprehension. The test has 15 sentences containing five syntactic structures (3 narratives, 3 interrogatives, 3 negative, 3 with inversion in L1 and 3 passive sentences)²⁴. The student is introduced to six colorful pictures on the computer screen and is to click on the picture that matches the spoken sentences as illustrated here in figure 2:

²⁴ Five syntactic structures are tested: declarative, interrogative, negative, inversion and passive. Helland and Kaasa (2005) use the term *narrative* for the declarative structures. Narrative is the term used for "a description of events, especially in a novel" (Oxford Advanced Learner's Dictionary, 2010). A declarative sentence on the other hand has the form of "a simple statement" (Oxford Advanced Learner's Dictionary, 2010), which I believe is the correct term to use in this regard. To avoid any confusion, I will be using Helland and Kaasa's term *narrative* with the meaning of *declarative*.

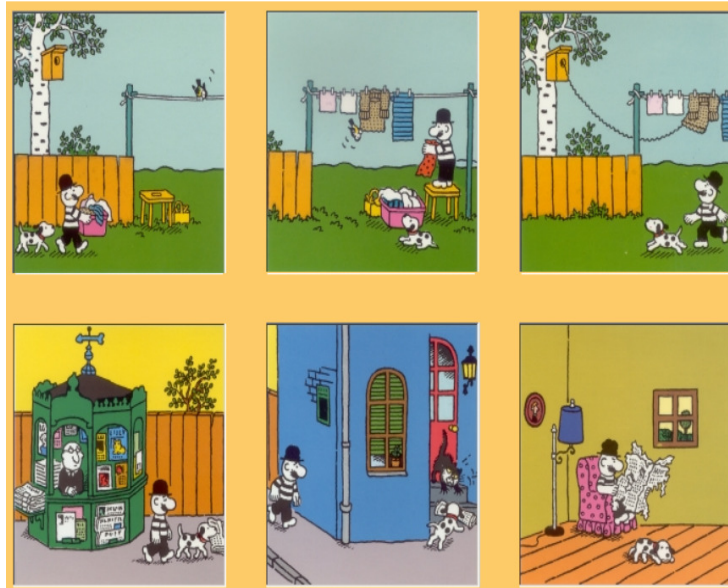


Figure 2

The answer is marked with a red frame. Each correct answer gives one point, so the total score is 15 points (Helland, 2008, Helland & Kaasa, 2005, Sanne, 2009). An example of each structure is provided in (1)-(5):

- (1) Narrative: *The dog is sleeping.*
- (2) Interrogative: *Does Mr. Jacob hang up his clothes?*
- (3) Negative: *The dog did not run after the man, but ahead of him.*
- (4) Inversion in L1: *Every morning the bird sits on the line.*
- (5) Passive: *The clothes are carried by Mr. Jacob.*

Test two - Model sentences:

The purpose of the next test is to evaluate the student's ability to produce sentences using a certain linguistic pattern and thus test both comprehension and production. This test also consists of 15 sentences: three interrogatives, three negative, three with inversion in L1, three with passive voice and finally three narrative sentences. First, the student is presented with three warm-up examples, one at a time, which the student is to listen to: a picture is shown on the left hand side of the screen while a recorded voice expresses what the picture shows: *The girl is reading* (see figure 3):

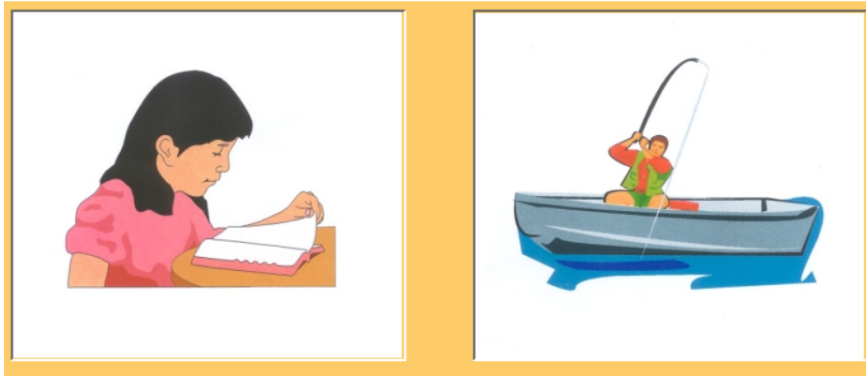


Figure 3

Then, a picture is shown on the right hand side, and the voice of a young student articulates a sentence matching the exact same grammatical pattern (the present progressive verb form: *be+ing*) as in the first picture: *The boy is fishing.*

After the three examples have been shown, the test begins as soon as the student is ready. Next follows an example of each structure with a correct answer suggested by Helland and Kaasa (2005):

(1) Interrogative: *Is she playing the drum?*

The student: *Is she playing the flute?*

(2) Negative: *He does not drink milk.*

The student: *He does not drink coffee.*

(3) Inversion in L1: *“This is my cat”, the girl said.*

The student: *“This is my dog”, the boy said.*

(4) Passive: *The bread is cut by the man.*

The student: *The car is fixed by the man.*

(5) Narrative: *The boy is eating an ice-cream.*

The student: *The man is reading a newspaper.*

The test leader is urged to score each answer within the categories morphology, syntax and semantics.²⁵ If there are no errors, the letter *r* for *right* is registered automatically. If errors are made, the number *0* is registered. Even though a *0* has been registered, the test leader is to evaluate if there are some correct morphological, syntactic or semantic elements in the utterance made by the student and then score an *r* (see figure 4).

		Poeng	Morfo- logi	Syn- taks	Seman- tikk	Lyd- klikk	Opp- tak
1. The boy is eating an ice-cream.	Fortellende	1	r	r	r	<u>1</u>	___
2. Is she playing the drum?	Spørrende	0	r	r		___	___
3. He drinks milk every morning.	Fortellende	0			r	___	___

Figure 4

²⁵ Inflected form of a word (morphology), word order (syntax), lexical words (semantics)

Each fully correct answer gives 1 point, thus total score is 15 (Helland, 2008, Helland & Kaasa, 2005, Sanne, 2009). The correct used forms of morphology, syntax and semantics are scored separately in a table as showed here in figure 5:

POENG (som ikke vises av de røde søylene):

	TEST 1	TEST 2	TEST 3	TEST 4
Fortellende	3 av 3	3 av 3		
Spørrende	3 av 3	2 av 3		
Nektende	3 av 3	1 av 3		
Inversjon	3 av 3	2 av 3		
Passiv	3 av 3	0 av 3		
Fonologi				1 av 2
Morfologi		9 av 15		0 av 2
Syntaks		9 av 15		0 av 2
Semantikk		11 av 15		2 av 2
Kommunikasjon			5 av 8	

Figure 5

Test three - Oral production – Daily Conversation:

The purpose of the next two subtests is to test the student's pragmatic skills, i.e. to test the ability to have a conversation and to use the English language. The student is to participate in a dialogue with a recorded voice by answering eight questions. These are:

- (1) *What is your name?*
- (2) *How old are you?*
- (3) *Can you count for me? One... two...*
- (4) *Tell me about your family.*
- (5) *Where do you live?*
- (6) *What are you going to do when you get home?*
- (7) *What did you do yesterday?*
- (8) *Do you have a hobby? Tell me about it.*

The student presses the record-button when ready to answer and the stop-button when finished. The time used to calculate word/minute is measured by the test program starting when the student presses the record-button and stopped when the student presses the stop-button. While the student answers the questions, a colorful picture is shown on the screen (see figure 6). This serves only as a decorative input.



Figure 6

Two things are to be evaluated: 1) time spent on task, i.e. words used per minute (calculated by the test program) and 2) whether the answers are communicative or not, i.e. 1 point if communicative, 0 points if not communicative (Helland, 2008, Helland & Kaasa, 2005, Sanne, 2009). When evaluating words/min, the issue is how much time the students use to articulate the answer, and how many words their answer contains. If a dyslexic student has few words/min, it may indicate that the student has some degree of difficulty in articulating sentences in English. If the student does not understand the technique with the start- and stop-button, the ratio words/min will be false low. All the students I have tested used the start- and stop-button correctly. Therefore I conclude that there was no bias in wrong use of technique in the measuring of time spent on giving the answer.

Helland and Kaasa (2005) do not provide a precise and objective description of how many communicative answers are required in total in order to be evaluated as *communicative*. This is problematic, and I have therefore decided on the following measure, when I do my own scoring: a student with *five communicative answers out of the eight questions asked* is considered to be *communicative*. The student is non-communicative if the number is lower than five. The reason for choosing the number five is that I find it necessary to have more than 50 % correct answers to be communicative. I choose 5 of 8 (62.5 %) and not 6 of 8 (75 %) because I find 75 % correct answers too high a requirement to pass the test.

Test four - Functional language use – Picture Story:

Again the focus is on pragmatic skills, i.e. how the student uses his or her own words in an oral task. In this test, the student is introduced to four colorful pictures which present a little story about a man and his dog (see figure 7). First, the student has 30 seconds to observe what is happening in the pictures (a small count-down scale is shown in the right side of the screen) and then, the student presses the start button when ready and begins to tell the story.

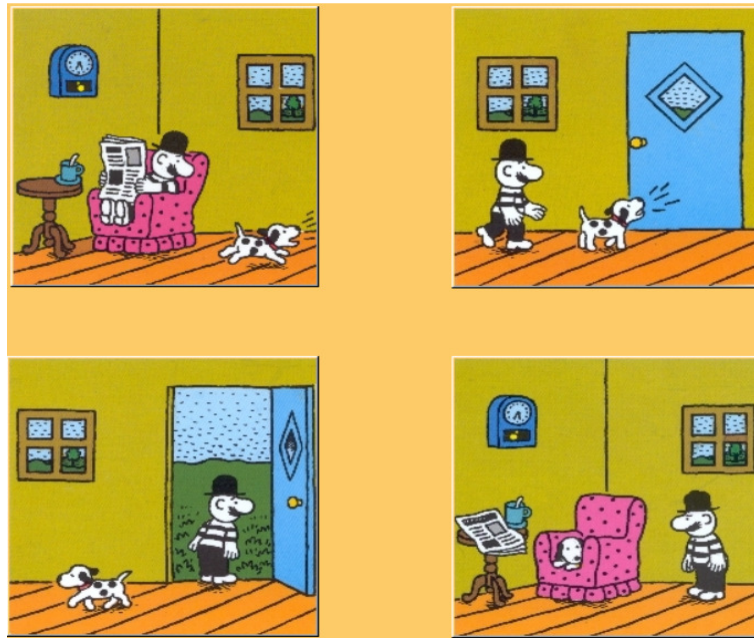


Figure 7

The test is timed in order to calculate spoken words per minute and as in the former test, the test leader is to evaluate and score if the student is communicative or not. Here, the quality of the communicative part is evaluated in the categories phonology, morphology, syntax and semantics (see figure 8). The score is 2 – 0 points and is scored as *acceptable*, *partly acceptable* and *not acceptable* (Helland 2008, Helland & Kaasa 2005, Sanne, 2009).


	Ord	Tid	Poeng	Opp- tak
	<input type="text"/>	<input type="text"/>	Fonologi <input type="text"/>	<input type="text"/>
			Morfologi <input type="text"/>	
			Syntaks <input type="text"/>	
			Semantikk <input type="text"/>	

Figure 8

As in test three, there is no exact description of how to score these extra criteria objectively and so, in accordance with my supervisor, I have decided *not* to score this and only include the results of the spoken words/min.

Test five - Single word dictation (Spelling):

The written part of the testing begins here. The aim of this next task is to observe how the student deals with English orthography as well as familiar and unfamiliar English sounds. The student is to write down 22 words of high-frequency and varying transparency. The 22 words are used in all

three written tasks. They are a mix of content words and function words. The words are: *boy, girl, school, child, cat, name, very, should, nose, mouth, much, when, could, just, beautiful, many then, what, house, little, than* and *high*. The student is to write the word in a sentence spoken by the recorded voice (see figure 9):

EX: *John is a boy* – write **boy** (it is only in the first three sentences where the recorded voice says “write” before the target word. Hence, the target word is just repeated)

EX: *You should do it* - **should**

EX: *They go to school* - **school**

EX: *She is so beautiful* - **beautiful**

EX: *Could you do it for me, please?* - **could**

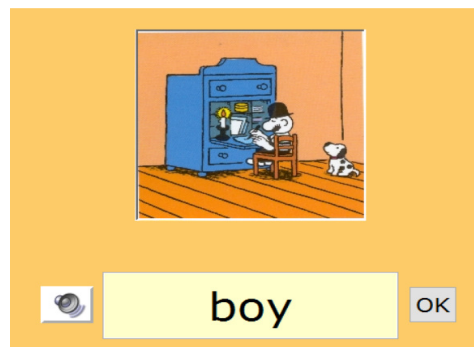


Figure 9

The total score is 22 points, one point for each correctly spelled word (Helland 2008, Helland & Kaasa 2005, Sanne, 2009).

Test six - Sentence reading (Reading):

The purpose of this test is to examine the student’s ability to read and pronounce familiar English words. The 22 words are put into 10 sentences. The student is requested to read aloud as follows (see figure 10):

1. *The **boy** is taller **than** the **girl**.*
2. *The **cat** is **beautiful**.*
3. ***When** was the **child** born?*
4. ***Could** you **just** tell me your **name**?*
5. *This is a **little** house.*
6. *There are **many** books at **school**.*
7. *Jim’s **mouth** is **much** too big.*
8. *The dog’s **nose** **should** have been washed.*
9. ***What** did he say **then**?*
10. *The mountain is **very** **high**.*



Figure 10

The test leader is again to evaluate if the 22 words are pronounced in a communicative way or not. The score is 1 point for an acceptable *communicative* pronunciation. To be an acceptable pronunciation, the student must show that s/he understands the meaning of the word. If the student cannot pronounce the words properly, the student receives 0 points²⁶ (see figure 11). The total score is 22 points (Helland 2008, Helland & Kaasa 2005, Sanne, 2009).

	Ord 1	Ord 2	Ord 3	Opp- tak
1. The boy is taller than the girl .	1	0	1	1
2. The cat is beautiful .	1			
3. When was the child born?	1	0		

Figure 11

Test seven - Sentence translation (Translation):

The purpose of this final written test is to evaluate the student's ability to translate English words into Norwegian. The student is asked to translate the same sentences and specific words just used above. I present only a few examples in (1)-(6) (see figure 12):

1. The **boy** is taller **than** the **girl** – *Gutten er høyere enn jenta.*
2. The **cat** is **beautiful** – *Katten er vakker.*
3. **When** was the **child** born? – *Når ble barnet født?*
4. **What** did he say **then**? – *Hva sa han da?*
5. The dog's **nose** **should** have been washed –
Hundens (sin) nese burde ha blitt vasket.
6. **Jim's** **mouth** is **much** too big – *Jims munn er altfor stor.*



Figure 12

The student's pronunciation of the 22 words is scored on being communicative or not with 1 point for an acceptable pronunciation and 0 for the opposite. The total score is 22 points (Helland 2008, Helland & Kaasa 2005, Sanne, 2009).

²⁶ The scoring of the pronunciation is evaluated subjectively by the test leader and so may be evaluated differently by a different test leader.

In sum, these seven subtests give researchers and teachers an opportunity to evaluate each student's basic performance in English because the test covers many important aspects of language (text comprehension, oral production, different grammatical structures, spelling, reading and translation). Despite there are some weaknesses in parts of the test, which I have commented on, the test can provide an overview of the difficulties that dyslexic students meet in the learning of a foreign language.

4.2.3 The participants

A total of 27 voluntary students from four dyslexia friendly primary schools (out of 12) in different areas of Norway were recruited for the research project. The schools were to have been acknowledged as dyslexia friendly before 2014, thus a possible measurable effect of the dyslexia friendly teaching and learning approaches could be observed. The students were divided into a dyslexic group and a non-dyslexic control group. The dyslexic group consisted of 8 students: 7 students from 6th grade and 1 student from 7th grade (5 girls and 3 boys). All students were born in 2004 except for the 7th grader, who was born in 2003. The criteria for selecting the students were that all students spoke Norwegian as their mother tongue, and that they were registered as dyslexics by the *Educational and psychological services*²⁷. Furthermore, the students did not have other comorbidities such as ADHD or SLI. They were all in regular classes. The control group consisted of 19 students (9 girls and 10 boys). Two boys were subsequently excluded from the control group because the school suspected that they were at high risk of having dyslexia or other difficulties. Also, the two boys had been reported to the *Educational and psychological services* but not yet acknowledged as dyslexics. Thus, the control group was now down to 17 students (9 girls and 8 boys). One girl had shown a degree of reading and writing difficulties, but was not under suspicion of having dyslexia and was considered as a “cognitively weaker” student compared to the other students in the control group. All other students did not have any history of reading- and writing disabilities according to their class teachers.

4.2.4 Procedure

My goal was to collect 20 dyslexic and 20 non-dyslexic students from different primary schools, so I could match Helland & Kaasa's study. However, the process of getting schools to participate appeared to be more challenging than first expected. Over a period of 4 months (September –

²⁷Pedagogisk-psykologisk tjeneste – PPT

December 2015), I contacted all 12 primary dyslexia friendly schools (approved as dyslexia friendly before 2014) by email explaining my project. I received only four answers, i.e. three positive answers and one rejection. The first email I sent out was to the schools' contact emails and then approximately three weeks later, a "reminder" email was sent to contact teachers and special aid teachers' email in the hope that there might be more response here. I received a few responses which were negative. After having discussed my situation with my supervisor, I started making phone calls to all schools. I called the schools' head numbers, teachers' offices and finally to the principals. At this point, I started to receive some responses but these turned out to be rejections after all. In February 2016, with the help from *Dysleksi Norge*'s two communication counselors, I received one more positive response. In this case, I realized that there in fact exist two schools with the same name in the Oslo area, and only one of them is dyslexia friendly. The non-dyslexia friendly school I had mistakenly contacted did not respond to my emails or explain to me that they were not dyslexia friendly and so precious time was lost.

Thus, the following four schools participated in the project:

- Sjøstrand skole (Vest-Agder, Kristiansand), dyslexia friendly since 2006
- Rustad skole (Akerhus, Ås), dyslexia friendly since 2012
- Solneset skole (Troms, Tromsø), dyslexia friendly since 2013
- Slåtten skule (Sogn og Fjordane, Førde), dyslexia friendly since 2014

The first testing began at Solneset skole and was executed by the author between the end of November and the beginning of December 2015. While the testing was going on at Solneset skole, the preparation for the testing at Slåtten skule was made and executed by a specialist teacher from the school in the middle of December 2015. The testing at Sjøstrand skole was carried out by a class teacher at the beginning of February 2016 and the final testing at Rustad skole, Ås was conducted by the author at the beginning of March 2016. In this final testing, it was important to me that I performed the testing myself. This was due to I had little time left to collect my data, and it would take too much time to send the test back and forth by mail (not email) as well as getting a teacher to perform the testing for me. Also, I had a very positive experience at Solneset skole as the test leader and wanted to observe some more children and their reactions in the test situation. I spent one day travelling back and forth from Tromsø to Ås and had a pleasant experience with some very courageous children.

The testing at Solneset skole lasted 4 days all in all and took place within school hours. Since the school did not have a language laboratory, the first few students were tested one by one in a quiet room and subsequently two by two with as much separation as possible between them. I gave a brief introduction to the test to each student and stayed in the room at all times to give further instruction if needed. The 18 students (three were dyslexic) were each asked right after the test, what they thought about the test and the test situation. Most children in the class gave their opinion with eagerness and enthusiasm and expressed themselves as follows: “it was a really fun test”, “it was the most hilarious test I have tried” and “it was fun to speak so much English”. A dyslexic student said: “it was a fun test although I felt kind of embarrassed with you sitting in the room”. All in all, the test experience seemed to be positive for the students.

The response from Slåtten skule was that the testing of their five students took one day. The three dyslexic students spent 45-50 minutes each. A little less time was used by the two control students. The test leader expressed that the test was easy to execute.

After having completed the testing of one dyslexic student, Sjøstrand skole reported back that the testing went well even though the student felt some uncertainty of what was required in each test. Furthermore, the student wanted to receive guidelines from the test leader to make sure that the test could be done properly. The test leader, who was the student’s class teacher, expressed that the testing seemed hard for the student all together and furthermore that it “took a while to complete”.

The test results from the students that were tested at Slåtten skule and Sjøstrand skole (not by the author) were sent by mail on a memory stick after the testing was completed and then evaluated by the author. Thus, all results of this research project are evaluated by the author.

As mentioned, the testing at Rustad skole, Ås (by the author) proceeded within one day. The original plan was to test two dyslexic students and two non-dyslexics, but unfortunately one of the dyslexic students was sick that day. The feedback from the tested dyslexic student was that “it was fun” and that “it was quite alright” having me in the room. The non-dyslexic students expressed that the test was “fun” and that it was “helpful” having me in the room.

In the next chapter, I provide a review of Helland and Kaasa’s results from 2005 and then present the results from the current testing of the students.

Summary

The research project presented in this chapter has one main and one secondary objective. The main objective is to investigate whether Norwegian dyslexia friendly schools have a positive effect on dyslexic students from 6th and 7th grade learning English as their L2. The secondary objective is to examine if there is a positive effect on the non-dyslexic students at the dyslexia friendly schools as well. For this purpose the *English 2 Dyslexia Test* is used on eight dyslexic students and on 15 non-dyslexic students from four different dyslexia friendly schools in Norway. The test has seven subtests which investigate the students' performances in specific areas of language acquisition that often cause dyslexic students problems. The results are compared to a former study (Helland and Kaasa, 2005), which tested 20 dyslexic and 20 non-dyslexic students. The predictions for the project are overall that there will be shown measurable positive effects compared to the study in 2005 in certain areas of the test in both the dyslexic and the non-dyslexic group attending the dyslexia friendly schools.

Chapter 5

Results

This chapter presents

- **a description of Helland and Kaasa's results (2005) (5.1)**
- **results of the current study 2016 (5.2)**
 - **comparison of the dyslexic group and the control group at the dyslexia friendly schools (2016) (5.2.1)**
 - **further processing of data 2016 (5.2.2)**
 - **an isolated interesting finding (5.2.3)**
- **Comparison 2016 vs. 2005 (5.3)**
 - **comparison of the two dyslexic groups (2016 vs. 2005) (5.3.1)**
 - **comparison of the two control groups (2016 vs. 2005) (5.3.2)**
 - **comparison of the results in 2016 (control vs. dyslexia) with the results in 2005 (control vs. dyslexia) (5.3.3)**
- **a summary**

5.1 Helland and Kaasa's results (2005)

As mentioned in the previous chapter, Helland and Kaasa (2005) recruited 20 dyslexic students from different parts of Norway as well as 20 non-dyslexic students acting as a control group. Also, Helland and Kaasa divided the dyslexic group into two subgroups by the median of the L2 comprehension test (see section 4.1 and 4.2.2). The group above the median was named C+ (non-impaired comprehension) and the group below the median was named C- (impaired comprehension) (Helland & Kaasa, 2005).

To recapitulate, here is a short description of each test:

L2 Comprehension test, max. score 15 points: the student is introduced to six colorful pictures on the computer screen and is to click on the picture that matches the spoken sentences.

Model Sentences test, max. score 15 points: first, the student is to listen to a recorded voice articulating a sentence with a specific grammatical structure matching a picture shown on the right hand side of the screen. Then, s/he is to articulate a sentence matching a different picture shown on the left hand side of the screen using the same grammatical structure as the first picture.

Evaluating morphology, syntax and semantics, max. score: 15 points: additional scores of each answer within the Model sentences test are provided within the categories morphology, syntax, and semantics.

Daily conversation test, measured in words/min: the student is to participate in a conversation with a spoken voice about daily life (name, age, family members etc.).

Picture story test, measured in words/min: the student is to look at four coherent pictures for 30 seconds and then tell the story about a man and his dog.

Literacy: Spelling, Reading and Translation, max. score: 22 points on all tasks: the same 22 words are used in each test, and the student is to spell, read and translate them.

Table 1 demonstrates the results from Helland and Kaasa's study (I have decided not to show standard deviation and *t*-value in this table) (2005: 49-54). As can be observed in table 1, the control group scored significantly higher than the dyslexic group on all tasks. The Model Sentences test was more difficult than the L2 comprehension test for both groups. The reason might be that in the Model sentences test, the students were to respond orally and use different syntactic structures (Narrative, Interrogative, Negative, Inversion and Passive), whereas in the L2 comprehension test, they were to respond by pushing a button on the picture matching the spoken voice using the same syntactic structures as just mentioned. Thus, giving an oral response may have been a challenge for the students, indicating that the vocabulary is limited and that processing the task was a barrier. The control group and the dyslexic group scored significantly higher in Syntax than in Morphology and Semantics. Both groups scored significantly higher in Semantics than in Morphology. This implies that Morphology and Semantics are more difficult for both dyslexic and non-dyslexic students. Both groups had significantly more words/min in the Picture Story than in the Daily conversation test, indicating that telling a story was less of a challenge and perhaps more amusing than answering daily questions. In literacy testing, the Spelling score was significantly lower than Reading and Translation for both groups. Sub-grouping the dyslexic group into C+ and C- showed significant difference in results in four out of ten tests between the control group and C+, i.e. Morphology, Spelling, Reading and Translation. Significant differences were revealed between the control group and C- on all tasks. There were significant differences on all tasks but Spelling between C+ and C-. Thus, dividing the dyslexic group into C+ and C- showed significant differences between groups and indicated that spelling is the main difficulty for dyslexics whether the students have good or poor comprehension skills.

Further processing of data (Helland and Kaasa, 2005)

1) “Scoring by graphemes”

A further analysis took place by “scoring by graphemes”.²⁸ Each of the 22 items could score one point per grapheme, e.g. *school* divided into four graphemes, s-ch-oo-l and thus four points. If a mistake was made, and the child had written s-k-u-l, then two graphemes were correct, *s* and *l*, thus 2 points. The results showed that there was no significant difference in the results between the subgroups C+ and C-. The subgroups had problems with more or less the same words, i.e. *should*, *mouth*, *much*, *could* and *than*. The word *high* was difficult for C- as well. There was some use of Norwegian letters (*ø* and *å*) but mostly in the C- group (p. 75-79). All groups adapted words to Norwegian phonology, e.g. *boi*, *haus*, *neim* (Helland & Kaasa, 2005: 54). According to Helland (2008), the problem for the dyslexic group (both C+ and C-) was the English phonology. The dyslexic group showed difficulties with the English unfamiliar phonemes /ð/, /θ/ and /w/. The phoneme /v/ also seemed difficult for some of the students (e.g. overgeneralizing “wery”/”wary”). Comparison between the control group and the subgroups C + and C- is not described in Helland and Kaasa’s article (2005). This comparison is described elsewhere (Helland, 2008: 74-79) and shows that the control group scored significantly higher than the two subgroups. In sum, the results showed that the English phonology was very difficult for the Norwegian dyslexics and that a certain amount of Norwegian transfer to English did occur.

2) *L2 comprehension and Model sentences*

Helland and Kaasa executed further processing of the data in two of the tests: the L2 comprehension test and the Model sentences test (see section 4.2.2) in the syntactic structures Narrative, Interrogative, Negative, Inversion and Passive. There are problems with the description of the results in Model sentences (Helland and Kaasa, 2005: 51). First, the *p*-value for Narrative comparing the control group and dyslexia group is missing. Second, they state that the control group scored significantly higher on Interrogative, Inversion and Passive (p. 54). However, in their table 3 (not shown here), it is stated that the differences in results on *Interrogative* and *Inversion* are non-significant and that the difference in results on *Negative* is significant. Which of the results that is correct, other than *Passive*, is unknown to me. Therefore, I will not consider these results. Regarding the L2 comprehension test in this matter, I will not go into further processing of these data in my thesis.

²⁸ Diphthongs were treated as one phoneme (Helland and Kaasa, 2005).

Table 1: Results: Helland & Kasa (2005)

Test (max. Score)	Control n = 20		Dyslexia n = 20		p	C+ n = 10		C- n = 10		Con vs. C+	Con vs. C-	C+ vs. C-
	Mean	SD	Mean	SD		Mean	SD	Mean	SD			
RECEPTIVE LANGUAGE												
Comprehension test (15)	13.60		9.95		***	12.40		7.50		ns	***	***
EXPRESSIVE LANGUAGE												
Model sentences (15)	9.45		4.35		***	7.20		1.50		ns	***	***
L2 comprehension vs. Model sentences												
		Significantly higher score in the L2 test		Significantly higher score in the L2 test								
(a) Morphology (15)	10.70 ¹		5.65 ¹		***	8.10		3.20		*	***	***
(b) Syntax (15)	14.20 ¹		10.60 ¹		**	13.70		7.50		ns	***	***
(c) Semantics (15)	13.15 ¹		8.90 ¹		***	12.00		5.80		ns	***	***
Daily conversation (words/minute)	41.74		23.12		***	30.67		15.58		ns	***	*
Picture story (words/minute)	63.19		37.25		***	49.06		25.44		ns	***	*
LITERACY												
Spelling (22)	13.90 ²		5.75 ²		***	6.30		5.20		***	***	ns
Reading (22)	19.90 ²		11.80 ²		***	13.90		9.70		***	***	**
Translation (22)	19.16 ²		12.25 ²		***	15.30		9.20		**	***	***

Notes: C+ (dyslexia subgroup above the median on L2 comprehension test); C- (dyslexia subgroup below the median on L2 comprehension test); *: p = 0.05. **: p = 0.01. ***: p = 0.001 ns: not significant

1) The differences in score between (a), (b) and (c) were significant.

2) The score in the spelling test is significantly lower than in the reading test and translation test.

5.2 Results of the current study 2016

To recap, in the current study I recruited eight dyslexic students from four different schools in Norway as well as 15 non-dyslexic students acting as a control group. As Helland and Kaasa (2005), I divided the dyslexic group into two subgroups by the median in the L2 comprehension test (see section 4.1 and 4.2.2).

5.2.1 Comparison of the dyslexic group vs. the control group at the dyslexia friendly schools (2016).

The predictions are repeated here for convenience (section 4.1):

The 2016 control group outperforms the dyslexic group on all tasks. The 2016 control group will perform significantly higher than C+ on the literacy tests but not on the remaining test. The 2016 control group will score significantly higher on all tests compared to the C- group. Within the subgroups, the C+ group will score significantly higher than C- on all tasks.

Table 2 shows a comparison between the dyslexic group and the control group 2016 including a comparison between the control group and the subgroups (C+ and C-) and additionally a comparison within the subgroups (C+ and C-). The control group outperforms the dyslexic group on all tests except the Picture story test. The control group scores significantly higher compared to C+ on Daily conversation, Spelling and Translation. The control group scores significantly higher than C- on all tests except for the Picture story test. Within the subgroups, C+ scores significantly higher than C- on L2 comprehension and Reading and thus non-significant on all other tests. I discuss these results in chapter 6.

Table 3 shows the correlation between the results in L2 comprehension test and the tests in Model sentences, Daily conversation, Picture story, Spelling, Reading and Translation. A correlation of 1.0 equals a linear positive relation (the higher score on the L2 test, the higher score in expressive language and literacy tests). A correlation of 0 indicates no correlation between the results on the tests. A correlation of -1.0 equals a linear negative correlation (the higher score in L2 test, the lower score in expressive and literacy tests).²⁹ Thus, there is a clear positive relation between the result in L2 comprehension test and Model sentences, Spelling, Reading and Translation. The correlation between L2 comprehension and Daily conversation and Picture story is lower but positive.

²⁹ <https://statistics.laerd.com/statistical-guides/pearson-correlation-coefficient-statistical-guide.php>

Table 2. L2 comprehension, production and literacy across groups control and dyslexia 2016

Test (max. score)	Control n = 15		Dyslexia n = 8		t-value	p	C+ n = 4		C- n = 4		F-value	p	Con vs. C+	Con vs. C-	C+ vs. C-
	Mean	S.D.	Mean	S.D.			Mean	S.D.	Mean	S.D.					
RECEPTIVE LANGUAGE															
Comprehension test (15)	13.24	1.95	10.63	2.88	2.33	*	13.00	1.83	8.25	0.96	12.25	****	ns	****	**
EXPRESSIVE LANGUAGE															
Model sentences (15)	7.65	3.71	2.25	2.49	4.29	***	3.75	2.76	0.75	0.96	7.91	**	ns	**	ns
(a) Morphology (15)	9.18	3.78	3.25	3.62	3.77	**	5.00	4.55	1.50	1.29	8.03	**	ns	**	ns
(b) Syntax (15)	10.24	4.18	4.25	4.13	3.37	**	6.75	4.57	1.75	1.50	7.73	**	ns	**	ns
(c) Semantics (15)	10	4.02	5.63	3.62	2.72	*	7.75	3.40	3.50	2.65	4.92	*	ns	*	ns
Daily conversation (words/minute)	73.82	15.85	47.25	13.08	4.42	***	52.25	11.73	42.25	13.96	8.86	**	*	**	ns
Picture story (words/minute)	75.53	49.37	47.88	29.82	1.73	ns	52.50	39.97	43.25	20.52	1.057	ns	ns	ns	ns
LITERACY															
Spelling (22)	16.59	3.99	6.38	4.50	5.48	***	8.75	5.25	4.00	2.16	19.20	****	**	****	ns
Reading (22)	20.88	1.17	16.75	3.28	3.46	**	18.50	2.89	15.00	2.94	17.75	****	ns	****	*
Translation (22)	19.00	3.20	8.00	7.58	3.94	**	11.00	8.41	5.00	6.27	15.61	****	*	****	ns

Notes: C+ (dyslexia subgroup above the median on L2 comprehension test), C- (dyslexia subgroup below the median on L2 comprehension test). *; p < 0.05. **; p < 0.01. ***; p < 0.001 ****; p < 0.0001 ns: not significant

Table 3. Correlation test data 2016

Pearson's product-moment correlation		
Test	L2 COMPREHENSION	Strength of correlation ¹
<u>EXPRESSIVE LANGUAGE</u>		
Model sentences	0.80	Very strong
Daily conversation	0.59	Moderate
Picture story	0.45	Moderate
<u>LITERACY</u>		
Spelling	0.71	Strong
Reading	0.72	Strong
Translation	0.72	Strong

1. Evans (1996). Guide to describe the strength of the correlation.

<http://www.statstutor.ac.uk/resources/uploaded/pearsons.pdf>

5.2.2 Further processing of data 2016

Communicative – non communicative score 2016

In Daily conversation, the answers were evaluated whether they were *communicative* or *not communicative* (1 – 0 points). After having set the parameter for being communicative to *five correct answers out of eight* (by the author), the results for C+ revealed that three students were evaluated as being communicative and one as non-communicative. In C-, two were communicative and two were non-communicative. In the control group, 14 were communicative and one was not. It is a challenge to get a valid comparison when comparing C+ and C- in communicative skills because the group consists only of eight students. However, it is interesting to observe that the student who scored non-communicative in C+ has the lowest score in this group and thus is the one in the C + group nearest the median. The two students who scored non-communicative in C- are in the middle of the group whereas the student lowest in the C- group actually scored second best here. I will not go further into these results because of the limitation in the scoring described in chapter 4.

As described in chapter 4, I have decided not to score whether the students were communicative or not in test 4, Picture story. The reason for this is that the scoring of communicative skills in test 4 was primarily subjective and not described sufficiently by Helland and Kaasa (2005).

“Scoring by grapheme”

As in Helland and Kaasa’s study (2005), a “scoring by grapheme” was performed in the 2016 group in order to detect any resemblance or difference in the two dyslexic subgroups’ spelling performances. To recap, the 22 words could score one point per grapheme, e.g. the word *boy* was divided into two graphemes, b-oy and thus 2 points (see section 5.1).

The results showed that the control group scored significantly higher than both subgroups. The results also showed, as in Helland and Kaasa’s study (2005), that there was no significant difference in the results between the subgroups C+ and C-. The data revealed that the two subgroups had the same spelling difficulties as in the 2005 subgroups in the words *should*, *mouth*, *much*, *could* and *than*. Only one student (C+) spelled *mouth* correctly. Also, two students in C+ made errors in the word *then* and so did three from C-. The errors made in *than*, *then* and *mouth* indicate that the students had difficulties with the English unfamiliar phonemes /ð/ and /θ/ but likely also with distinguishing between the vowels *a* (*than*) and *e* (*then*).

Other words that seemed difficult for both subgroups were, e.g.:

Beautiful: *bjutifol*, *pjutifule*, *deatifol*

High: *hei*, *haim*, *hail*

Child : *skjeld*, *traid*, *chaid*

Just: *sjost*, *drjost*, *djost*

School: *skool*, *scool*, *schole*,

Nose: *noaus*, *nows*, *nous*

Little: *litel*, *litte*, *ltel*

As can be observed, some of the students adapted the words to Norwegian phonology as in the 2005 group, e.g. *beautiful*/*bjutifol* and *high*/*hei*. There was one student (C-) who made rather striking spelling errors as in *child*/*thryding* and *high*/*maymt*. It was clear that this student struggled severely. Only one student (C-) used the Norwegian \emptyset in the word *girl* and wrote *gøl*. Two students, both from C+, made overgeneralization from English in regard to the word *very* and wrote *wery*. Overall, it seems safe to say that the 2016 dyslexic subgroups had severe difficulties in the spelling test, i.e. phonological problems, transfer to Norwegian phonology and letter (\emptyset) as well as overgeneralizations. This manifests the gravity of how difficult English spelling is for dyslexics.

5.2.3 Isolated interesting finding

A salient result in oral production was found, i.e. the Daily conversation test. The 2016 *dyslexic* group scored higher (47.25 words/min) than the 2005 *control* group (41.74 words/min). Statistics on this difference in results have not been calculated, but it is a very positive result indicating that the focus on verbal skills are very strong at dyslexia friendly schools (see table 1 and table 2).

5.3 Comparison 2016 vs. 2005

Next, I compare the results from 2016 with 2005 to see if there are indications of a positive effect of the dyslexic and non-dyslexic students attending Norwegian dyslexia friendly schools.

5.3.1 Comparison of the two dyslexic groups (2016 vs. 2005)

The predictions are repeated here for convenience (section 4.1): There is a measurable significant effect on the dyslexic students' performances at the dyslexia friendly schools compared to 2005 in oral testing, reading and translation. However, we will probably not see an improvement in spelling or in the additional scores in morphology, syntax and semantics (in the Model sentences test), and morphology will be the most challenging task.

Table 4 provides the results of the comparison between the two dyslexic groups. As can be observed, the 2016 group scores significantly higher than the 2005 group in Daily Conversation (oral testing) (47.25 vs. 23.12 words/min). There is no significant difference between groups in the Picture story test. The 2016 group scores significantly higher than the 2005 group in Reading (16.75 vs. 11.80) in the literacy part of the test (Spelling, Reading and Translation), No significant difference is shown in Spelling and Translation between groups. The L2 comprehension test shows no significant difference between groups. The same is seen in Model Sentences. In the evaluation of Morphology, Syntax and Semantics, there is no significant difference in Morphology between groups, but the 2005 group scores significantly higher than the 2016 group in both Syntax (10.60 vs. 4.25) and Semantics (8.90 vs. 5.63).

Table 4. L2 comprehension, production and literacy across groups dyslexia 2005 and dyslexia 2016

Test (max. Score)	Dyslexia 2005 n = 20		Dyslexia 2016 n = 8		t-value	p
	Mean	S.D.	Mean	S.D.		
<u>RECEPTIVE LANGUAGE</u>						
Comprehension test (15)	9.95	3.03	10.63	2.88	0.66	ns
<u>EXPRESSIVE LANGUAGE</u>						
Model sentences (15)	4.34	3.50	2.25	2.49	- 2.37	ns
(a) Morphology (15)	5.65	3.42	3.25	3.62	- 1.88	ns
(b) Syntax (15)	10.60	3.65	4.25	4.13	- 4.35	**
(c) Semantics (15)	8.90	4.26	5.63	3.62	- 2.56	*
Daily conversation (words/minute)	23.12	4.28	47.25	13.08	5.22	**
Picture story (words/minute)	37.25	4.00	47.88	29.82	1.01	ns
<u>LITERACY</u>						
Spelling (22)	5.75	4.17	6.38	4.50	0.39	ns
Reading (22)	11.80	4.29	16.75	3.28	4.26	**
Translation (22)	12.25	4.71	8.00	7.58	- 1.59	ns

Notes: *: $p < 0.05$. **: $p < 0.01$. ***: $p < 0.001$ ****: $p < 0.0001$ ns: not significant

5.3.2 Comparison of the two control groups (2016 vs. 2005)

The predictions are repeated here for convenience (section 4.1): There is a measurable positive effect on the non-dyslexic students' performances from the dyslexia friendly schools in all areas of the test, particularly in oral production and in Reading. Spelling will not show improvement.

Table 5 demonstrates that the 2016 control group's score on the Daily conversation test is highly significant compared to 2005. Also, the 2016 control group has significantly higher scores on Spelling and Reading, whereas the control group 2005 shows significantly higher scores on Syntax and Semantics. I expand on these results in chapter 6.

Table 5. L2 comprehension, production and literacy across groups control 2005 and control 2016

Test (max. Score)	Control 2005 n = 20		Control 2016 n = 15		t-value	p
	Mean	S.D.	Mean	S.D.		
<u>RECEPTIVE LANGUAGE</u>						
Comprehension test (15)	13.60	2.09	13.24	1.95	- 0.77	ns
<u>EXPRESSIVE LANGUAGE</u>						
Model sentences (15)	9.45	3.32	7.65	3.71	- 2.01	ns
(a) Morphology (15)	10.70	2.90	9.18	3.78	- 1.66	ns
(b) Syntax (15)	14.20	1.51	10.24	4.18	- 3.91	***
(c) Semantics (15)	13.15	1.76	10	4.02	- 3.23	**
Daily conversation (words/minute)	41.74	13.35	73.82	15.85	8.35	****
Picture story (words/minute)	63.18	20.20	75.53	49.37	1.03	ns
<u>LITERACY</u>						
Spelling (22)	13.90	4.81	16.59	3.99	2.78	*
Reading (22)	19.90	2.10	20.88	1.17	3.47	***
Translation (22)	19.16	2.61	19.00	3.20	- 0.21	ns

Notes: *: p < 0.05. **: p < 0.01. ***: p < 0.001 ****: p < 0.0001 ns: not significant

5.3.3 Comparison of the results in 2016 (control vs. dyslexia) with the results in 2005 (control vs. dyslexia)

The predictions are repeated here for convenience (section 4.1): The 2016 control group outperforms the dyslexic group on all tasks. The 2016 control group will perform significantly higher than C+ on the literacy tests but not on the remaining test. The 2016 control group will score significantly higher on all tests compared to the C- group. Within the subgroups, the C+ group will score significantly higher than C- on all tasks.

In 2005, the control group scored significantly higher than the dyslexic group on all tests. The results were the same in 2016 except for the oral production test, Picture story, where the difference in result was non-significant, dyslexic vs. control. Thus, the prediction did not hold completely since there is an indication of improvement of oral skills.

In 2005, the difference in score was non-significant in *six of ten* tests when comparing the control group and C+ (L2 comprehension, Model sentences, Syntax, Semantic, Daily conversation and Picture story). In 2016 the difference in score was non-significant in *seven of ten* tests (L2 comprehension, Model sentences, Morphology, Syntax, Semantic, Picture story and Reading).

Thus, the salient result is the 2016 C+ group's score in Reading (literacy) since it was non-significant compared to the score in the control group. In 2005, C+ was outperformed in all literacy tests indicating that there is an improvement in literacy (reading).

In 2005, the difference in score was significant in *ten of ten* tests when comparing the control group and C-. In 2016 the difference in score was significant in *nine of ten* tests. The test that showed no significant difference in result was Picture story. Thus, there is an indication of improvement of oral skills.

In 2005, the difference in score was non-significant in *one of ten* tests (Spelling) when comparing C+ and C-. In 2016, the difference in score was non-significant in *eight of ten* tests (Model sentences, Morphology, Syntax, Semantic, Daily conversation, Picture story, Spelling and Translation). The result indicates an overall positive improvement for the C- group in 2016 compared to the results in 2005. I discuss the above mentioned results in chapter 6.

As mentioned above, in both studies (2005 and 2016), the control group outperformed the dyslexic groups significantly on all tasks, except for the Picture story test in 2016. Nevertheless, we see a positive tendency in the significance score in favor of the dyslexia friendly schools in four tests:

2005 (control-dyslexia)/ 2016 (control-dyslexia):

- L2 comprehension: 2005: p -value = 0,001, 2016: p -value <0,05
- Morphology (in Model sentences test): 2005: p -value = 0,001, 2016: p -value <0,01
- Picture story: 2005: p -value = 0,001, 2016: non-significance
- Translation: 2005: p -value = 0,001, 2016: p -value <0,01

When comparing the dyslexic groups (2005/2016), there is no significant difference in results in the four tests just mentioned (table 4). When comparing the control groups (2005/2016), the result is the same (table 5). Even though there is no significance between the dyslexic groups, the results in the four tests indicate an improvement and a positive development in the dyslexic group from the dyslexia friendly schools compared to the control group, in particular in regard to Picture story (oral production). Further investigation on these specific subjects would be interesting.

Summary

The primary and secondary results from the current research are summed up as follows:

Comparing the dyslexic groups 2016 with the 2005 dyslexic group, the 2016 group scored significantly higher on Daily conversation and Reading, whereas the 2005 group scored significantly higher on both Syntax and Semantics.

Comparing the control groups 2005/2016, the 2016 group scored significantly higher on Daily conversation, Reading and Spelling. The 2005 group had significantly higher scores on Syntax and Semantics.

Comparing the 2016 dyslexic and the control group with the 2005 dyslexic group and control group, the results showed that the control groups outperformed the dyslexic groups except in 2016 where the oral production test (Picture story) was non-significant. Comparing the control with C+, C-, the results showed oral and reading improvement. Within the subgroups, an improvement was detected in favor of the C- group over a broad spectrum except for L2 comprehension and Reading.

Chapter 6

Discussion

The main objective of this thesis has been to investigate whether Norwegian dyslexia friendly primary schools have a positive effect on 6th and 7th grade dyslexic students learning English as their second language. The analysis was carried out by comparing a group of eight recently tested dyslexic students (2016) from four different dyslexia friendly schools in Norway with dyslexic students from non-dyslexic schools in a former study (Helland and Kaasa, 2005). Helland and Kaasa tested a group of 20 dyslexics and 20 non-dyslexics in English proficiency using the *English 2 Dyslexia Test* for this purpose. The areas of language acquisition covered in the test were text comprehension, oral production, grammatical structures and literacy (spelling, reading and translation). A secondary objective for my study has been to examine the effect of the dyslexia friendly schools on the non-dyslexic students as well as on the dyslexics. This analysis was performed by comparing the 2016 control group (15 students) with the 2005 control group (20 students) and additionally by comparing the 2016 dyslexic and control group with the 2005 dyslexic and control group. The groups tested in the current study are smaller than the groups in 2005 and so my results can only indicate possible differences and cannot provide completely clear answers.

6.1 Comparison of the two dyslexic groups (2016 vs. 2005)

As mentioned in chapter 4, the predictions for the results between the two dyslexic groups were as follows: the 2016 dyslexic group would perform measurably better than the 2005 dyslexic group in Reading, Translation and Daily conversation/Picture story (oral production). The predictions were based on a strong focus on improving literacy and oral skills at the dyslexia friendly schools by the use of multisensory learning and metacognitive strategies as well as structured teaching. Furthermore, the dyslexia friendly schools seem to provide an open and inclusive environment, which invite the students to participate orally in the classrooms. The result in Spelling was not expected to show a significant difference in favor of the 2016 group compared to the 2005 group. Dyslexics seem to struggle persistently and substantially with spelling due to poor phonological-orthographical, morphological and syntactic awareness. In the evaluation of the linguistic structures (in the Model sentences test; Morphology, Syntax and Semantics), the expectations were that Morphology would be the most difficult one. As mentioned in chapter 5, the results showed that the 2016 dyslexic group scored significantly higher than the 2005 dyslexic group in Daily conversation and Reading but not in Translation. The 2005 dyslexic group scored on the other hand significantly

higher on Syntax and Semantics, but not in Morphology. In all other test results there was no significant difference. In the following sections, I discuss the two significant results in favor of the 2016 group in regard to Daily conversation (6.1.1) and Reading (6.1.2). Then, I provide an analysis of other results of the testing (6.1.3).

6.1.1 Daily conversation

The significant positive result for the 2016 dyslexic group is convergent with my predictions. The focus on improving the oral skills in the dyslexic students through dyslexia friendly teaching strategies seems to have had the desired influence. The eight questions in the test varied in degree of difficulty:

1. *What is your name?*
2. *How old are you?*
3. *Can you count for me? 1-2-3*

None of the students had difficulties with responding to these questions. Some of the students answered with only one word (their name, age), others put in a few more words, e.g. “my name is...”, “I am 11 years old”.

Question 4 - 8 were the most challenging ones:

4. *Tell me about your family*
5. *Where do you live?*
6. *What are you going to do when you get home?*
7. *What did you do yesterday?*
8. *Do you have a hobby? Tell me about it.*

In these four questions, the students’ mistakes were made in the following categories: Norwegian vocabulary, syntax and morphology. Here are some of the students’ replies:

Norwegian vocabulary:

Question 6: “I skal til *Place Name*”.

The student uses the English personal pronoun “I” and the rest of the sentence are in Norwegian.

Question 8: “Yes, I have a hobby and that is *skiing*”.

The student pronounces the word for “skiing” with the Norwegian /ʃ/-sound.

Syntax:

Question 7: “I *os going* to gymnastics”

The student has difficulties in building up the sentence using the correct verb form, e.g. irregular past tense of “to go”, i.e. “I went to gymnastics”.

Question 8: “Yes to horse and gymnastics”

The student shows difficulties in building up the sentence with the basic S-V indicating a small vocabulary.

Morphology:

Question 4: “There are three person in my family”.

The student does not use the plural –s suffix in *person*.

Question 7: “I play in the snow”.

The student does not use the past tense suffix –ed in *play*.

The dyslexic students gave communicative responses even though they seemed to struggle in the last five questions. The students struggled with syntax and morphology as well as they used Norwegian words frequently, which showed that they had vocabulary problems. As mentioned in chapter 2, dyslexic students experience many difficulties in L2 English. Different sets of skills interact with each other that often are impaired, such as the ability to analyze and memorize linguistic structures (syntax, morphology, phonology) and make self-correction in the process (metacognition) (Dal, 2008). As mentioned in chapter 1, the underlying cause for these difficulties are all established by research as differences in the brain’s way of processing literacy tasks and making information comprehensible (Shaywitz, 2003, Schneider, 2009). All in all, the results showed a significant difference in favor of the 2016 group despite the errors that were made. What needs to be acknowledged is that the students made an incredible effort in their responses. Instead of keeping quiet, they tried to the best of their ability. Thus, it seems as the dyslexia friendly schools have built up a culture that makes the children accustomed to expressing themselves without feeling embarrassed or discouraged. I did not sense any embarrassment in the dyslexic students, and they accomplished the testing with a good spirit. When a school applies to *Dysleksi Norge* to get approved as a dyslexia friendly school, two out of the ten criteria that need to be fulfilled are to have focus on “a favorable and positive learning environment” and on “all students feel[ing] understood and respected” by the staff (Solem, 2015: 106-107). In my point of view, these

criteria are the very foundation of a good teaching environment and when the teaching environment is good with an acceptance of one another, then learning and motivation is likely to occur. In my opinion, this factor has made a decisive difference in the positive result we have seen here.

As I pointed out in chapter 4, there is a limitation in the scoring of the Daily conversation test. In the test battery, the guidance is vague concerning how to score Daily conversation. The instruction is that the test leader is to give one point if the student's utterance is *communicative* and 0 points if *non-communicative*, but what is also to be taken into account is that "it is not an absolute must that the utterance is correct". Thus, if we look at one of the student's utterances described above, e.g. (question 8: *Do you have a hobby? Tell me about it*) "Yes to horse and gymnastic", the meaning of the sentences is understandable and scored as *communicative* by me as the test leader. Nonetheless, since the construction of the sentence is very poor (i.e. lacking the basics, i.e. S-V), there is the possibility that another test leader would consider the reply as *non-communicative*.

6.1.2 Reading

The results showed that the 2016 group had significantly higher scores than the 2005 group, which was in accordance with my predictions. To recap, the students were to be recorded while reading ten sentences aloud containing the 22 target words (*boy, than, girl, cat, beautiful, when, child, could, just, name, little, house, many, school, mouth, much, nose, should, what, then, very* and *high* (see chapter 4). Thus, they were challenged in two areas which are difficult for dyslexics, reading and pronunciation. Nine of the 22 words caused all eight dyslexics problems, i.e. *than, then, when, child, could, mouth, much, should, and high*. There were no difficulties with the remaining words, and the students read and pronounced the words without problems. According to the Orthographic Depths Hypothesis (see chapter 2), the inconsistent deep orthography in English is very problematic for language learners and in particular for dyslexic students (Nijakowska, 2010). This is evident in the nine words that the 2016 group struggled with. Viewing the nine words, we can see that some of them have unfamiliar sounds that do not exist in Norwegian (see chapter 2, section 2.4.2), e.g. /θ/: *mouth* /'maʊθ/, /ð/: *than* /'ðæn/, *then* /'ðen/ and /w/: *when* /'wen/. Seven of the students found the word *child* (/tʃaɪld/) very problematic. They pronounced the word /tʃild/ indicating that they used the Norwegian sound corresponding to the letter *i*. The students had no difficulties in reading and pronouncing the /tʃ/-sound since Norwegian has this sound, e.g. *atjsjo* (when sneezing) (/at'ʃu:/) (Skaug, 2005: 152). Three students had problems with the word *much* (/mʌtʃ/), where one student

pronounced it /mjʊf/ and another /mʌnsj/ (the third student did not attempt to read the sentence aloud). The last three words *could* (/ˈkʊd/), *should* (/ˈʃʊd/) and *high* (/haɪ/) were a huge obstacle to read out loud for all eight students. This comes as no surprise since there is no reliance on the sound-letter correspondence in the words due to the deep orthography. Considering the spelling results from the additional “scoring by grapheme” calculation (see chapter 5), the words that caused the dyslexics problems are the same as in the reading test. The word *beautiful* could potentially have been an obstacle to read due to the inconsistency in grapheme-phoneme representation and the length of the word, but all eight children pronounced the word effortlessly. In the spelling test, the word was extremely difficult (e.g. *bjutifol*, *pjutifule*, *deatifol*). This tells us that the dyslexic students struggled both with the reading and the spelling of these words. However, the spelling test showed that the dyslexics have a much deeper problem in this regard and that the differences between English and Norwegian play a role both in reading and spelling.

As mentioned in chapter 3 and 4, a possible explanation for the positive result in Reading is the strong focus the dyslexia friendly schools have on improving the reading skills of dyslexic students. As soon as a student shows signs of delayed reading development, the school initiates support and adjusted learning strategies, so the student can get back to having a good and progressive reading development. As mentioned in chapter 3, *Dysleksi Norge*³⁰ has produced the web based English course called “I want to participate” for all dyslexic students at all levels as well as for foreign language teachers. The goal is to adjust the English learning classroom to dyslexic students as well as to provide teachers with information about what dyslexia is and how to help the students in the best way possible. The focus is on phonological awareness training, direct and structured tutoring, the use of multisensory and metacognitive methods and the integration of computer aid programs. In practice this may for example mean that a dyslexia friendly school such as Solneset skole uses a concept called “guided reading”. The students are divided into small groups (a maximum of six students in each group) and are guided by a teacher. The students work with different areas within the field of reading, i.e. phonology, orthography and morphology, and utilize for instance repetitive texts, which enhance the memory of what is read, as well as songs and rhymes. In group work, students go from one “station” to another and by the use of board games and flashcards, they improve their vocabulary. Besides, a phonetic alphabet is put on the wall to support the students

³⁰ http://www.dysleksinorge.no/no/skjult/artikler_fakta/Kursstruktur+%22I+want+to+participate%22.9UFRDUYG.ips

while working. A learning strategy called *word map* (*ordkart*) is used as well. Word map is a table presenting a word's meaning, a synonym for it and a drawing. This strategy helps the dyslexic students to remember the meaning of the word as well as to put it into different contexts. In parallel to the above, the students are guided through dialogue (metacognition) with the teacher whose aim is to make the students reflect on their own reading progress and on what can be improved (Appendix A: 5-7). In sum, due to the use of guided reading and word maps, the dyslexic students are provided with the needed supervision and support. Thus, in my opinion the positive result in Reading is caused by the dyslexia friendly schools' persistent focus on improving reading skills by the use of evidence-based teaching methods recommended by *Dysleksi Norge*.

6.1.3 Other results

I predicted that the 2016 group would show higher scores in Translation, but the results showed non-significance between the two groups. The reason for my prediction for a positive result in the 2016 group was that the dyslexia friendly schools also focus on translation practice. As mentioned in chapter 3, multisensory strategies are used in vocabulary learning with the use of flash cards, e.g. English words receive the colour green and the Norwegian words are red. Then, when translation is practiced, the words on the flash cards are given in English, and the children translate to Norwegian and vice versa. In translation (and reading) practice, the students use computers as one of the most important tools because the computer can read a text aloud both in English and in the two forms of the Norwegian language, *bokmål* and *nynorsk* and thus support the students in the recognition of Norwegian and English words. Nonetheless, translation seems to be as much of a challenge for the 2016 group as for the 2005 group. With regard to Spelling, I expected no measurable improvement between the two groups. As mentioned in previous chapters (1, 2 and 4), spelling is a persistent and severe difficulty that most dyslexics suffer from, and the results from 2005 and 2016 support this.

The additional scoring in Morphology, Syntax and Semantics was performed in the Model sentences test. I predicted that Morphology would be the most challenging. The reason for this prediction was that Helland and Kaasa's study had shown this exact result, but also because English morphology is challenging for all Norwegian learners of English and in particular for dyslexics (see chapter 2). The results showed significant higher scores in Syntax and Semantics in the 2005 dyslexic group compared to the 2016 dyslexic group. According to Lightbown and Spada (2013), the teaching method known as *structured-based instructional approach* is when "the teacher's goal

is to see to it that students learn the vocabulary and grammatical rules of the target language... [the] goal may be to pass an examination rather than to use the language for daily communicative interaction beyond the classroom” (p. 123-124). According to Gjendemsjø (2013), this approach was dominating back in the 70s. The *communicative instructional approach* then became more and more dominating and has been prevalent in the Norwegian schools for decades (Gjendemsjø, 2013). The communicative instructional approach has focus on “the communication of meaning, both between teacher and students and among students themselves in group- or pair work. Grammatical forms are focused on only in order to clarify meaning” (Lightbown and Spada, 2013: 127). The significant higher scores in Syntax and Semantics in 2005 indicate, despite the use of *communicative instructional approach*, the non-dyslexia friendly schools in 2005 had more focus on grammar and vocabulary than on improving reading and oral skills compared to the dyslexia friendly schools. As mentioned, the significant higher score in results in Reading and Daily conversation in 2016 indicate that the dyslexia friendly schools put their effort into improving the reading and communicative skills in their students. This is done through multisensory methods instead of using the structured-based instructional approach, which dyslexic students will not benefit from at all considering how difficult the learning of grammar and rules are for them.

All in all, the significant higher score in the 2016 dyslexia group compared to the 2005 dyslexia group in oral production and the reading tests provide support for the claim that the dyslexia friendly schools *do* have a positive effect on the dyslexic students in important skills such as being able to communicate and read in English. The requirements for being acknowledged as a dyslexia friendly school by *Dysleksi Norge* seem to be well-founded and used at the dyslexia friendly schools participating in this project. In my opinion, communication and reading skills in a foreign language are much more important to master in a future career perspective than knowing grammatical structures and rules by heart.

6.2 Comparison of the two control groups (2016 vs. 2005)

The predictions for the results between the two groups of non-dyslexic students were that the 2016 group would show significant improvement over a broad spectrum of the testing compared to the 2005 group, particularly in Reading and the oral production tests (Daily conversation and Picture story). In Spelling, the results would probably show a non-significant result. My predictions were borne out in two areas: Reading and Daily conversation. The 2016 result in the Daily conversation

test turned out to be highly significant (p -value $< 0,0001$). The 2016 result in the Reading test was highly significant as well but the p -value was slightly lower (p -value $< 0,001$). The surprise here was that the result in Spelling was significantly higher in the 2016 group (p -value $< 0,05$) and so pointing in a positive direction in favor of the dyslexia friendly schools. The 2005 control group scored significantly higher on the Model sentence's additional scoring in Syntax and Semantics. The mentioned results (Daily conversation, Reading, Syntax and Semantics) are similar to the results seen in the comparison of the two dyslexic groups, except for the Spelling result. As mentioned in chapter 2, the English opaque orthography makes spelling difficult for many learners of English due to the inconsistent grapheme-phoneme correspondence. The reason for the positive spelling result indicates that the dyslexia friendly teaching methods have had a beneficial effect on spelling in the 2016 control group. The 2016 dyslexic group has not shown the same development in spelling. This indicates, despite the efforts on the dyslexic friendly schools, that the competence in English spelling is too difficult a task for the dyslexics to achieve. All in all, what can be concluded is that the dyslexia friendly schools' positive effect on the dyslexic students is the same on the non-dyslexics students in Reading and oral production and additionally in Spelling. The significant results in favor of the 2005 group in Syntax and Semantics give a hint of where the non-dyslexia friendly schools' attention was in 2005, which may have been more on structured-based instructional settings (see section 6.1.3).

6.3 Comparison of the results 2016 (dyslexic vs. control group) with the results 2005 (dyslexic vs. control group)

In this paragraph, I describe some overall interesting tendencies when comparing the result 2016 (dyslexic vs. control) with the results 2005 (dyslexic vs. control). It is problematic to draw specific conclusions because of the small sample of dyslexic students in 2016. I have now on several occasions described the positive influence that the dyslexia friendly schools seem to have on the dyslexic students as well as the non-dyslexic students (i.e. the use of evidence-based acknowledged and structured teaching methods on the students and a positive learning environment). Overall, when looking at the comparison of results (see chapter 5) between the 2016 results (dyslexics vs. controls) and the 2005 results (dyslexics vs. controls), the tendencies seem to go in a positive direction which supports the principles used at the dyslexia friendly schools. This is summarized in the following comparisons as seen in chapter 5 (see table 1 and 2):

- The control group vs. the dyslexic group (2005/2016): in 2005, the control group outperformed the dyslexic group on all tests. In 2016, the results were nearly the same, except for the difference in results in Picture story which was non-significant, thus: *oral skills enhanced*.
- The control group vs. the subgroups (C+ and C-): the 2005 C+ group was outperformed by controls in the literacy test (Spelling, Reading, Translation) and Morphology. The 2016 C+ group was outperformed in Spelling and Translation but not in Reading, thus: *reading skills enhanced*. The 2005 C- group was outperformed by the controls on all tests. The 2016 C- group showed the same results except for the oral production test, Picture story, thus: *oral skills enhanced*.
- The two sub-groups, C+ vs. C- (2005/2016): in 2005, the C+ group outperformed the C- group on all tests except for Spelling, whereas in 2016, all results between groups were non-significant except for Reading and L2 comprehension, thus: *oral skills, spelling, translation and grammatical structures enhanced in C-*.

The tendencies mentioned here indicate, as we have seen in the comparison of results between the two dyslexic groups (section 6.1) and the comparison of results between the two control groups (6.2), that the dyslexia friendly schools seem to provide the learning environment that ameliorates the students in oral and literacy skills compared to 2005.

In addition, in regard to the isolated finding (see section 5.2.3), the 2016 dyslexic group's higher score in Daily conversation compared to the control group 2005 is the more apparent indicator for the positive effect of the dyslexia friendly schools. The reason for the control 2016 to outperform the dyslexic group in Daily conversation is that this group also benefits from the principles used at dyslexic friendly schools. This effect may be more profound than for the dyslexic group. Therefore, I expect that the dyslexic group will always be outperformed in most tests by the non-dyslexic students.

6.4 Limitations

The limitation in the present research project is that I only recruited eight dyslexic students to participate whereas Helland and Kaasa had 20. Therefore the results must be viewed as tentative and with caution. Furthermore, as mentioned in chapter 4, dividing the dyslexic group into C+ and

C- by the median score in the L2 comprehension test is a limitation for comparisons between studies using this test battery.

In the two oral tests (Daily conversation and Picture story), Helland and Kaasa do not describe how they have scored *communicative*, *non communicative* and *acceptable*, *partly acceptable* and *non acceptable*. The test leader is asked to make a subjective evaluation of the scoring (see chapter 4 and 5) in regard to whether the students' utterances are *communicative* or *non-communicative*. For the Picture story test, the answers are evaluated differently, i.e. *acceptable*, *partly acceptable* and *non acceptable* in regard to phonological, morphological, syntactic and semantic structures. The question is how the test leader ensures consistency of the scoring and that the scoring is as close to Helland and Kaasa's as possible.

Despite the weaknesses in the test battery, i.e. several tests depending partly on components of subjective evaluation by the test leader (tests 3, 4, 6 and 7), I still find the results from the test battery to be a reasonable indicator of development for students at the dyslexia friendly schools. The test battery needs to be further developed to have less subjective evaluation. This would potentially make the test battery more valid and hereby enable more objective comparisons of results from studies using the test battery.

Summary

In this chapter, I have discussed the test results from the comparison between the 2016 dyslexic group and the 2005 dyslexic group, the 2016 control group and the 2005 control group and finally between the 2016 dyslexic and control group and the 2005 dyslexic and control group.

The discussions can be summed up as follows:

The results showed that the dyslexia friendly schools have a positive influence on the dyslexic students in two areas of the test; in oral production and reading. The strong focus on dyslexia friendly teaching strategies as well as making all students feel included in the classrooms are likely the reasons for the positive results. Results in favor of the 2005 dyslexic group at non-dyslexic friendly schools showed significantly higher scores in Syntax and Semantics. This may be ascribed to a more structured-based instructional view on teaching methods.

The findings in the comparison of results between the two control groups (2005/2016) showed high significant results in favor of the 2016 group in literacy (reading and spelling) and in oral production. The 2005 control group scored significantly higher in Syntax and Semantics. Thus, the results were very similar to the 2005/2016 dyslexic groups except for the spelling test. The 2016 control group's significant result in Spelling indicates that the dyslexia friendly methods improve the non-dyslexic students despite the opaque English orthography.

A third comparison of results took place between the 2016 dyslexic and control groups and the 2005 dyslexic and control groups and showed that the oral and literacy skills were enhanced as well as there were positive significance results in favor of the dyslexia friendly schools.

Chapter 7

Conclusion

The main objective of this research project was to investigate whether the Norwegian dyslexia friendly schools had a positive effect on 6th and 7th grade dyslexic students learning English as their second language. The secondary objective was to examine if there was an effect on non-dyslexic students as well. The current research project, eight dyslexic students and 15 non-dyslexics from four different Norwegian dyslexia friendly schools, was compared to a former study from 2005 (Helland & Kaasa, 2005), 20 dyslexic and 20 non-dyslexic from six different non-dyslexia schools. The test battery used in the project examined the students in text comprehension, oral skills, grammar and literacy (spelling, reading and translation). Though the test battery has some limitations because of an element of subjectivity in the scoring in certain tests, it is a helpful tool that can be used as an indicator of the linguistic strengths and weaknesses in dyslexic students. The results indicated that the dyslexia friendly schools have a positive effect on the dyslexic students in specific areas of language acquisition, i.e. oral and literacy skills (i.e. reading). Furthermore, the results indicated a positive effect on the non-dyslexic students in oral and literacy skills (more specifically reading and spelling). These positive results are most likely due to the effects of turning a school into a dyslexia friendly school (approved by *Dysleksi Norge*) and the committed teachers of these schools using well-structured teaching strategies, e.g. multisensory and metacognition. This is combined with an open and inclusive teaching environment that seems to support the dyslexic students in improving their literacy skills and in being comfortable enough to express themselves without feeling embarrassed.

Other results from the testing (i.e. in syntax and semantics) indicated that the non-dyslexia friendly schools may have a different focus on teaching methods and on which topics are prioritized by the teachers. This was shown in results both in the comparison between the dyslexic groups (2016/2005) and the control groups (2016/2005). Positive tendencies in the significance score were detected in favor of the dyslexia friendly schools in the comparison of the 2016 dyslexic group and control group with the 2005 dyslexic group and control group. These were in comprehension, morphology, oral production and translation. Furthermore, the 2016 dyslexic students did not show improvement in their spelling skills, but the 2016 non-dyslexics did. This confirms findings from a lot of previous research that spelling is an extremely difficult task for dyslexics.

The results of my research project are interesting since this kind of research at dyslexia friendly schools have not been carried out before, and it sheds light on an extraordinary learning environment that can be highly recommended to *all* Norwegian schools. It is important to mention that it takes time to change old working procedures and habits in a group of staff. The intensions may be positive when a school decides to take upon themselves to become dyslexia friendly, but it all comes down to each principal and each teacher's personality and attitude toward changes and the incorporation of knowledge about dyslexia.

In this regard, I wish to talk briefly about a personal experience I had at Solneset skole while I was performing the testing of the students. I had a chance to talk to a contact teacher about the changes that the staff had gone through since they became dyslexia friendly (in 2013). The contact teacher explained that it had not been an easy process, but all teachers had committed themselves to the new task in becoming dyslexia friendly. Furthermore, the contact teacher explained that the group of staff is very open and honest with each other in order to stay on the right track together as a team. The contact teacher expressed that "we are not perfect, but we do our very best every single day". In my opinion, this is an example of the importance of the teachers' enthusiasm and dedication to the task which will help them to develop and get better and better over time as a group and individually.

In closing, the results demonstrated in this research project indicate that the dyslexia friendly schools have a positive effect on both dyslexic and non-dyslexic students in important areas of foreign language acquisition such as oral and literacy skills. The findings point to a large number of students in Norway who has favourable future prospects in regard to foreign language skills and hopefully an interesting and eventful working life ahead of them. Considering the time difference of 11 years between the two studies (2005 and 2016), the improvement in results in 2016 could be influenced by an improvement of English proficiency in Norway in general. My recommendations for future research are to optimize the test battery and perform a similar and longitudinal study with a larger sample of participants testing both dyslexics and non-dyslexic students. The optimal future project would be to test English proficiency in all 6th and 7th grade dyslexic students at every dyslexia friendly school in Norway (currently 28 schools). The control group should be an equal or larger number of students from schools situated in the same region as the dyslexia friendly schools. This is to compensate as much as possible for potential socio-economic differences. In such a study, it could be interesting to compare the results in the dyslexic group at the dyslexia friendly schools

with the control group at non-dyslexia friendly schools and vice-versa (the control group at the dyslexia friendly schools with dyslexic students at non-dyslexia friendly schools). It could also be interesting for researchers in other fields (e.g. Math, Social science, Biology) to study whether the positive effect of the dyslexia friendly schools in L2 oral production and reading is seen in their fields of education as well. These studies could be done in collaboration with linguists in order to evaluate whether there is a beneficial effect compared to non-dyslexia friendly school.

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Veileder
elever med lese – og skrivevansker

- Når eleven har fått diagnosen
- Arbeidsmetoder
- Tips til lærer og utforming av klasserom
- Hjelpemidler som kan benyttes



SOLNESET SKOLE
2015-2018

Når en elev har fått diagnosen:

- Når en elev har fått diagnosen dysleksi og det står i sakkyndig vurdering at eleven har krav på PC, må kontaktlærer dele ut infoskriv fra Tromsø kommune «Infoskriv til foresatte om innkjøp av elev-PC – H2014». Dette finner vi på felles under ressursgruppe/skjemaer/datamaskin. Det er foreldrene som søker om PC. Søknadsskjema finnes på NAVs hjemmesider. Skolen vil være behjelpelig med søknad.
- Dersom det i sakkyndig vurdering anbefales bruk av Lingdys/ Lingright, må skolen søke om lisens til eleven. Dette gjøres samtidig på søknad om PC. De søker via NAV. Når eleven får innvilget programmene, sendes lisensen til foreldrene, og det er foreldrene som har ansvar for å installere programmene. Skolen må etterspørre om de trenger hjelp. Søknadsskjema finnes på NAVs hjemmesider. Hver lisens kan installeres på fem maskiner. IKT- ansvarlig på skolen gjør dette.
- Dersom eleven ikke allerede har fått installert Daisy-lydbøker, bør dette gjøres nå. Kontaktlærer har ansvar for dette. Se arket «Hjelpemidler».
- Eleven bør også få eget lånenummer og pinkode i NLB (norsk lydbok og blindeskriftbibliotek). Se arket «Hjelpemidler».

Hjelpemiddel	Hva/hvor?
CD-ord m/scanread	Skal finnes på alle datamaskiner på alle klasserom. Dersom det ikke finnes, må IKT-ansvarlig få beskjed. Kontaktlærer gir opplæring. CD-ord kan også lastes ned som en app til iPad og Iphone. Da kan man ta bilde av tekst og få den opplæst. På hjemmesida til MVnordic kan man finne brukerveiledninger og videoer i forbindelse med bruken av CD-ord.
Norsk lyd- og blindeskriftbibliotek (NLB)	Skolen har eget lånenr og pinkode (lånenr: 48497, pinkode: 8614). Vi kan også opprette eget lånenr og pinkode for de elever som trenger det.
Lydhør (app)	Med Lydhør kan du spille av Daisy-lydbøker på iPhone eller iPad. Du kan også spille av lydbøker du låner fra NLB og fra andre biblioteker.
Daisy-bøker (fag-lydbøker)	Disse lånes på Statped av rektor. Lydbøkene kan også streames. Lydbøkene lånes til enkeltelever (på navn) og installeres på pc til denne eleven (både på skolen og hjemme). Vivi hjelper til med dette. Kan spilles av på «Lydhør»-appen (mini-ipad), eller man må installere AMIS (pc).
Lingdys og Lingright	For elever med dysleksi. Må stå i sakkyndig vurdering at eleven trenger disse programmene. Hver lisens kan installeres på fem maskiner. Opplæring og daglig bruk skjer både i klasserom og lesekurs. Alle lærere må gi opplæring og påse at programmene blir brukt i sine fag.
Smartbøker	Finnes for de fleste fag og trinn. (alternativ til papirversjonen av skolebøkene).

Arbeidsmetoder—dysleksivennlig?**Problemstilling:**

Howdan sikre ulike arbeidsmetoder på en dysleksivennlig måte?

Generelt:

I følge dysleksiforbundet bør all undervisning følge disse retningslinjene:

- Metoder som sikrer forståelse
- Gode les- og læringsstrategier
- Gode rutiner for vurdering for læring
- Bruke flere sansekanaler i undervisningen, jfr. Læringsstiler
- Gos struktur i all undervisning
- Gode lekseplaner/avtaler med foreldrene.

Stasjonsundervisning:

- Jobbe inn rutiner før en starter med fagarbeid på stasjonene (gruppesjef, rekkefølge, ryddetegn, osv.)
- Planer/store bilder på hver stasjon som forklarer hva som skjer hvor.
- Hvilke forventninger har vi? Kriterier for læring.
- Gruppestørrelse – fra tre til seks elever.
- Tilrettelegge med lydbok, leseapper, lesepenne etc. hvis det er en lesestasjon.
- Programmer som f.eks. *skoleskrift* om det er på skrivestasjoner.
- Fokus på ulike læringsstiler, auditivt, visuelt m.m.

Veiledet lesing:

- Bør være to voksne, for faglig støtte
- Kan bruke nivådelte tekster
- Kan bruke samme tekst til alle uansett nivå
- Lærerstyrt samtale om teksten, som er tidsbegrenset for å sikre at alle elever er innom læringen.
- Kan organiseres som stasjonsundervisning, men det må ikke det
- Kan brukes i alle fag

Lesestrategier:

- Lesestrategier som store plakater i klasserommet
- Plansje med den aktuelle letestrategien
- Vårig jobbing med samme lesestrategi
- Elevene lærer strategiene: skumlesing, letelesing, nærlesing, lineær lesing, ikke-lineær lesing, stillelesing, korlesing, høytlesing og opplevelseslesing.

Samarbeidslæring:

- En måte å organisere undervisning på
- Dele ut klare roller til elevene som rullerer hver dag eller ukentlig
- ... er ikke gruppearbeid der alle elevene gjør samme oppgave på gruppa. Elevene på gruppa har hver sin oppgave som de deler med hverandre.
- Klare strukturer på hvordan elevene samspiller
 - Regler for diskusjoner
 - Regler for hvem som henter utstyr
 - Ansvarlig for skriving (bruke ipad, lingdys etc)-kanskje bør alle skrive på pc. Bruke skriverammer som støtte.

5

Vurderingsformer:

- Klare mål for timen med kriterier for måloppnåelse
- Oppsummere timer med undervisningsvurdering
- Ved egen vurdering tilpasses formen for dyslektikere, symboler fremfor tekst, stikkord osv.
- Hva skal du lære og hvordan skal du bruke det?
- Praktisere læringsløyfen
- Egenvurdering – kameratvurdering
- Leselos – lesekraftet

Arbeid med skriving:

- Bruk av skriverammer og modellering av skriving i alle fag
- Setningsstartere, plakater med ord elevene kan bruke
- La elevene skrive to og to
- Ha regler for samarbeid
- Tenkeskriving – fokusere på tankene
- Korte skriveoppdrag koblet til lesing

Arbeid med lesing:

- Ha klare leseoppdrag
- Knytte lesing opp mot mål
- Leselos - egenvurdering
- Lesestrategier
- Læringsstrategier – BISON, venn-diagram osv.
- Bruke skriveoppdrag for lesing
- Begrepslæring – ulike strategier

6

Dysleksivennlig tips om Engelsk**Gloser**

Differensiert gloseinnlæring. Færre gloser enn andre elever. Engelske ord skrives med grønt og norske med rødt. Ved gloseprøver gis ordene på engelsk og oversettes til norsk. Bruk flashcards når nye gloser skal innlæres.

Applikasjon

- Pugge, Quizlet, glosetyggeren
- Lydbøker f.eks. kizclub.com

Generelt

- Bruke sanger og rim
- Bruke repeterende tekster/modelltekster
- Ha lydskrift av alfabetet på veggen
- Bruke stasjonsundervisning hvor en benytter brettspill og lage flashcards av nye gloser
- Legge lydfiler på hjemmesiden til leseleksa/lesetekster slik at elevene kan lytte til teksten og øve på uttale. Filene legges på office 365 på klassens område
- Bruke læringsstrategien *ordkart*. Tabell med plass til begrep, setning, mening, tegning og synonym.

Nettbrett og datamaskin

- *Lydhør* – Høre bøker opplest på nettbrett og smarttelefon
- *IntoWords* – Hjelper deg til å lese og skrive på pc og nettbrett. Leser opp tekst på bokmål, nynorsk og engelsk. Skrivehjelp i form av relevante forslag.
- *Translate.google.no* – ordbok
- *LingRight* – skriveprogram

7

Klasserommet – dysleksivennlig?

En god skole for dyslektikere forutsetter at det tas spesielle hensyn i klasserommet.

- Elever med lese- og skrivevansker kan sitte langt foran.
- Sitte ved siden av motiverte elever eller en elevhjelper som kan gjenta læreres instruksjoner.
- Skape et rolig miljø i klasserommet da elever med denne problematikken ofte kan la seg distrahere av støy og bevegelser.
- Et klasserom preget av klare strukturer.
- Henges opp en godt synlig timeplan.
- Informasjon skal være lett å finne og synlig.
- Henge opp ord som er vanskelig for eleven slik at elevene får visuell støtte.
- Benytte ulike fargekoder for ulike infotyper.
- Oppslag om for eksempel lekser er hele tiden å finne på samme sted.

8

Samarbeid skole/hjem**Lesekurs**

- Foreldremøte med lesekurslærere
- Test før/etter
- Lesekurs begynner i starten på en økt
- Møtepunkt foreldre, kontaktlærere og lesekurslærere
- Reduksjon av annen lekse
- Rutiner ved fravær/info til vikar
- Lesekurslærere presenterer lesekurs for kollegiet ved start

Foreldremøte

- Tydelig formidling
- Lite tekst på f.eks. invitasjon, ark som deles ut, ukeplaner og powerpoint.
- Hvilke forventninger har vi? Kriterier for læring.
- Gruppestørrelse – fra tre til seks elever.
- Tilrettelegge med lydbok, leseapper, lesepenner etc. hvis det er en lesestasjon.
- Programmer som f.eks. *skoleskrift* om det er på skrivestasjoner.
- Fokus på ulike læringsstiler, auditivt, visuelt m.m.

Lærer—dysleksivennlig?

- Bruker korte setninger.
- Gjentar viktige utsagn.
- Forklarer nye ord og begreper.
- Sjekker at elever med lese- og skrivevansker har forstått nye ting ved å få dem til å gjenfortelle.
- Er tålmodig da elever med denne vansken ofte trenger lenger tid.
- Starter timen med å fortelle hva som skal skje, hva som skal gjennomgås og hvordan stoffet skal jobbes med.
- Hjelper eleven med å kaste unødig papir.
- Hjelper eleven med å få med seg hjem riktige bøker.
- Vektlegge å lære eleven studieteknikker.
- Oppmuntrer eleven til å bruke data.
- Ikke redd for å innføre kompenserende hjelpemidler tidlig.
- Retter elevens arbeid på en positiv måte.

Norsk samfunnsvitenskapelig datatjeneste AS

NORWEGIAN SOCIAL SCIENCE DATA SERVICES



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Institutt for språkvitenskap UiT Norges arktiske universitet

9019 TROMSØ

Vår dato: 06.11.2015

Vår ref: 45288 / 3 / AGL

Deres dato:

Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 21.10.2015. All nødvendig informasjon om prosjektet forelå i sin helhet 01.11.2015. Meldingen gjelder prosjektet:

45288	<i>Dyslexia in second language acquisition</i>
Behandlingsansvarlig	UiT Norges arktiske universitet, ved institusjonens øverste leder
Daglig ansvarlig	Marit M. Westergaard
Student	Annette Mygind Stagelund

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, <http://www.nsd.uib.no/personvern/meldeplikt/skjema.html>. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://pvo.nsd.no/prosjekt>.

Personvernombudet vil ved prosjektets avslutning, 31.05.2016, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Audun Løvlie

Kontaktperson: Audun Løvlie tlf: 55 58 23 07

Vedlegg: Prosjektvurdering

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Avtalingskontorer / District Offices

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Samtykkeerklæring for deltakelse i forskningsprosjekt

Dyslexia in second language acquisition

Jeg er dansk masterstudent ved Universitet i Tromsø. Jeg arbeider for tiden med en masteroppgave i engelsk språk som vil bli avsluttet mai 2016. Temaet for arbeidet er *Dyslexia and second language acquisition* hos 6. og 7. klasse elever på en dysleksivennlig skole. Med dette arbeide ønsker jeg å kartlegge ordblinde elever sine engelske ferdigheter og sammenligne med et tidligere studie (Helland og Kaasa 2004), der testede ordblinde barn fra 6. og 7. klassetrin på ikke-dysleksivennlige skoler i Norge. Jeg ønsker at undersøke om de dysleksivennlige skoler har en positiv effekt på engelskundervisningen. 12 dysleksivennlige skoler er invitert til deltakelse.

Jeg ønsker å teste elevene i engelsktesten *The English 2 Dyslexia Test*. Testen er utviklet af Dr. Polit./logoped, Professor Turid Helland, Institutt for biologisk og medisinsk psykologi, Universitetet i Bergen og Cand.san./logoped Randi Kaasa, Logopedisk klinikk, Haukeland sykehus. Testen, som vil foregå på skolen, vil bestå av 7 deltester (språkforståelse, mønstersetninger, samtale, bildefortelling, høytlesing, orddiktat og oversettelse) og vil ta i underkant av 1 time. Testen er frivillig og eleven kan trekke seg når som helst uten å måtte begrunne dette nærmere. Testen er elektronisk.

Ved publisering vil resultatene bli presentert i anonymisert form, og ingen enkeltperson vil kunne gjenkennes i den ferdige oppgaven. Når prosjektet avsluttes skal alt datamateriale makuleres. Studien er godkjent av Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS. Jeg ønsker å publisere oppgaven min i et anerkjent tidsskrift.

Dersom dere velger å delta, vil det være til stor hjelp for oppgaven min og bidra til økt kunnskap om dette temaet. Professor Turid Helland og Dysleksi Norge er mye positive overfor prosjektet mitt.

På forhånd takk for hjelpen!

Med vennlig hilsen

MA-student: Annette Mygind Stangelund

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Veileder: Prof. Marit Westergaard

CASTL-Universitetet i Tromsø/UiT

(marit.westergaard@uit.no)

Jeg har mottatt informasjon om studien, og gir mitt samtykke i at mitt barn _____ deltar i studien "Dyslexia in Second language acquisition"

Sted: _____ Dato: _____

Underskrift foresatte: _____