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Cover, Copy, and Compare: An Effective Strategy for ASL Acquisition for Students with Dyslexia?

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I am submitting herewith a dissertation written by Sara Evans entitled "Cover, Copy, and Compare: An Effective Strategy for ASL Acquisition for Students with Dyslexia?." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

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Cover, Copy, and Compare: An Effective Strategy for ASL Acquisition for Students with Dyslexia?

A Dissertation Presented for the

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DEDICATION

To my parents, Don and Ethel Evans. I know you are proud, and I am grateful for the lessons you taught, the determination and tenacity you instilled.

ABSTRACT

A single subject, multiple baseline study was designed to determine the benefits of Skinner's Cover, Copy, Compare (CCC) intervention for students with dyslexia who are learning American Sign Language. (ASL). The number of educational institutions offering ASL as a foreign language is on the rise; ASL has become the third most taught language in the U.S. (Mitchell, 2006). However, there is a misconception that it is an easier language to learn than orthographic languages. In fact, ASL is a complex language with its own grammatical rules including complex syntax and semantics. Learning a visual language may present a unique challenge to dyslexic learners; it requires constant visual attention, paired-associate learning and recall, which may be challenging for dyslexic learners. Cover Copy Compare (CCC) as an intervention for dyslexic learners has proven successful in learning other content (i.e., spelling words). CCC strategies were implemented to reinforce ASL vocabulary to four post-secondary students identified with dyslexia. By using CCC in a multimedia format, the need for receptive and expressive skills are addressed, therefore addressing both aspects of ASL acquisition. The major findings suggest participants improved recall of signs as an expressive skill. As they are able to recall signs with greater fluency, their ability to communicate with fluence can increase as well.

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CHAPTER 1
INTRODUCTION

American Sign Language (ASL) has been accepted at some institutions of higher education as a second language requirement for more than 30 years. Widespread acceptance of ASL has increased more recently as states in the U.S. began to accept ASL as a second language not only in the postsecondary world but in the K-12 setting as well. The National Association of the Deaf (NAD) identified 45 states that have specific legislation identifying ASL as a language (*States That Recognize American Sign Language*, 2016). The remaining states recognize ASL as a second language at institutions within the state but do not have specific legislation addressing ASL. Although some states passed legislation more than 20 years ago, most have done so within the last four to five years, emphasizing the relatively recent acceptance of ASL as a second language. With the acceptance of ASL as a language with its own unique grammatical and linguistic structures, educational institutions are able to offer ASL as a second language. In the U.S., in addition to ASL being more widely recognized as a second language, as seen in the increase of ASL course offerings as universities work to meet the demands of students seeking to learn ASL as a second language, formal standards of ASL have been established within the Deaf community. The American Council on the Teaching of Foreign Languages (ACTFL) in conjunction with the American Sign Language Teachers Associations (ASLTA) and The National Consortium of Interpreter Education Centers (NCIEC) formalized the American Sign Language National Standards in 2012 (National ASL Standards, 2012). The struggle to have ASL recognized as a linguistically sound and unique language has been long. Now, use of

ASL reaches beyond the cultural boundaries of the Deaf community to hearing individuals who otherwise have no connections with the Deaf community. As this surge in acquisition of ASL as a second language for non-deaf learners continues, we must consider the implications for all learners as well as the challenges associated with learning a visual language versus an orthographic language.

Emergence of the Study

During the last seven years, I have taught ASL as a second language to hearing students at the post-secondary level. This followed a transition from teaching K-12 Deaf Education for 18 years in the public-school setting. Both settings framed my perspective on teaching ASL and my understanding of the struggles some students face in learning ASL as a second language, particularly students with specific disabilities. As is required by each of the universities in which I was employed, students with disabilities who were eligible to receive accommodations provided documentation of the need for accommodations. However, this documentation did not identify the disability, only the accommodations needed. Accommodations such as extended time on tests, repetition of test items and/or use of a special test setting were necessary for students who struggled with understanding what was being signed to them, but these accommodations did not address the struggles students had with expressive skills. In the classroom where the teacher signed the test and the student recorded the equivalents in English, I noticed some students did not seem to need these accommodations. These same students did not struggle with receptive language but expressive language. They were able to comprehend ASL equally as well as peers who did not receive accommodations. But they were not able to recall signs effectively to

communicate with fluency. As these students continued in the ASL courses, some of them disclosed to me they had been identified as dyslexic. This prompted several conversations about what they perceived as the challenges they faced with learning ASL and what types of interventions were necessary. Assessments that required these students to read ASL signs and record English equivalents did not present a challenge. Assessments that required these same students to express themselves in ASL, to go from English to ASL and produce phrases in the target language with the added component of three-dimensional language presented the challenge. ASL utilizes space in signing and is multidimensional. A sign that is placed on the forehead such as *FATHER* changes meaning when it is placed on the chin, which means *MOTHER*. Space becomes a grammatical feature in ASL. Students who were accustomed to English which is one dimensional on paper were now learning a language that is expressed using the entire body. During this time, as part of my course work for my doctoral degree, I developed a single-subject design study to research an intervention with potential to positively influence the ASL learning of students with dyslexia. Through conversations with faculty members at UT, the self-managed intervention Cover, Copy, and Compare (CCC) (Skinner et al., 1997) was introduced as a possible intervention. As I researched CCC further, it appeared to address the concerns presented by my former students. Cover Copy Compare is a self-managed intervention in which students are able to improve specific skills in academic subject areas by viewing an academic stimulus, covering it, copying it, and then comparing their response to the original stimulus. As CCC has typically been used in a “pen and paper” format, it was necessary to modify this to use with a visual language such as ASL. This was accomplished using

video recordings and online software that enabled the student to view a recording of the stimuli as it played on the computer while the computer's webcam recorded the student's response. A pilot study was carried out during the Spring semester of 2017, and the results showed CCC to potentially be an effective intervention for building expressive ASL skills. Students identified positive reactions to the repetition of signs and the accuracy of the input. Frustrations seemed to lessen as the participants were able to have access to accurate signs with which to practice their own expressive skills. Students had a need for exposure to accurate modeling of the target language outside the classroom, which CCC seemed to provide.

Statement of problem

As with many research questions, my own experiences shaped the rationale for this study. As a teacher of the Deaf and Hard of Hearing in the public schools, I have worked with a variety of learners, both Deaf and Hard of Hearing, as well as hearing learners with disabilities. However, my experience with students with dyslexia is limited and I had minimal knowledge of how dyslexia impacts ASL acquisition. Anecdotal reports from students indicated they struggled recalling individual signs. Some reported they struggled with fingerspelling as well, but the greater challenge seemed to be how quickly they could recall specific signs to use in conversation. Students reported benefitting from additional practice with native signers outside the classroom. They also reported added anxiety when signing in front of peers or native signers, which increased the challenge of recalling signs for expressive language. These anecdotal observations are mirrored in the literature. For example, similarly, McKee and McKee, 1992, conducted research on students' perception of the most difficult aspects of learning

ASL. They used a scale from 1-6, with 1 equaling easy and 6 equaling difficult. Results indicate students rated vocabulary a 3 on the scale. Students reported learning ASL from different teachers with different signing styles or accents as an additional reason for their struggles. As is true with any language, individuals have their own way of expressing themselves and their own accent with ASL. There can be subtle changes in movement or placement of a sign that does not change the overall meaning. Native and fluent speakers of the language recognize these as inconsequential to the overall meaning of the message, but it can cause confusion for new learners of the language. They also indicated (lexical) variation between teachers, or when there is not a one-to-one correspondence between an English word and ASL sign as reasons for struggles (McKee & McKee, 1992). As mentioned previously, students who have acquired language as an aural/oral modality now must acquire and use language in a visual-gestural modality which can be mentally and physically demanding on students. This was the case with the students in my classes, particularly those identified with dyslexia. How do we address this struggle? Does dyslexia have an impact on ASL acquisition and how can teachers address the learning challenges for these students?

Research Questions

The following research question was examined in this study.

1. Is Cover, Copy and Compare an effective strategy for ASL acquisition for students with dyslexia?

Background, Beliefs and Assumptions

As a researcher, I recognize that my beliefs and experiences affect the lens through which I view my study. Decisions made throughout this study are made and influenced by my experiences, both personally and professionally with teaching ASL. As a hearing individual who developed ASL as a second language, I must identify how my experiences impact my approach to this study.

Beliefs and Assumptions

I believe learning a second language is extremely beneficial and supports academic achievement, providing cognitive benefits and affecting attitudes and beliefs about language and other cultures. As demonstrated in the literature, second language learning correlates with higher academic achievement on standardized tests and critical thinking skills as well as improved first language achievement (Armstrong & Rogers, 1997; D'Angiulli et al., 2001)

Secondly, I believe ASL is a second language with unique linguistic features and has all equal to features in spoken and orthographic languages. In ASL, “handshapes, movement and other grammatical features combine to form signs and sentences” (Valli et al., 2011, p. 14). ASL is a linguistic system and is independent of English and has all the features of a language. In addition to the linguistic system of a language, it is important for students to understand and appreciate the culture from which the language is derived. Learners of ASL must have exposure to the beliefs and practices of Deaf people. Learning a language goes beyond just correct or incorrect vocabulary, it is a learning process with many layers.

Lastly, I believe dyslexia is a learning disorder characterized by unique linguistic difficulties. Individuals with dyslexia struggle with decoding, the ability to break down words into components, and may have poor vocabulary development and trouble discriminating grammatical and syntactic differences. Individuals struggle with understanding and manipulating individual sounds as well as identifying and manipulating units of spoken language. In addition, there is often a deficit in rapid automatic naming or RAN (*Dyslexia Assessment: What is It and How Can It Help? - International Dyslexia Association*, 2020; Vellutino, 1987).

Definition of Terms

The following definitions are given to provide clarity for terms and abbreviations used throughout this dissertation.

General Terms

ASL – American Sign Language is a natural language used by members of the North American Deaf community. It has developed naturally over time.

CCC – Cover, Copy, and Compare (CCC) is a self-managed intervention that can be used to enhance accuracy in academic subject areas. In CCC, students look at an academic stimulus. They then cover it, copy it, and evaluate their response by comparing it to the original fact. If there is an error, the students engage in error correction procedures before moving onto the next item. CCC is carried out quickly allowing for fast recall of the learning objective with accuracy. CCC has been used as an intervention in a variety of settings and has been modified in ways such as changing

the order of steps, adding additional steps, separating speed from the accuracy, etc. This is referred to as Modified CCC or MCCC.

Deaf –uppercase Deaf refers to a particular group of deaf people who share a language – American Sign Language (ASL) – and a culture. The members of this group have multi-generational traditions of sign language use or use it as a primary means of communication among themselves and hold a set of beliefs about themselves with a positive attitude towards deafness, as having a “deaf gain” rather than a “hearing loss”.

deaf – lowercase deaf refers to the audiological condition representing a range of hearing levels. In this dissertation, it represents a medical view of deafness and deafness as a deficit.

hard of hearing - refers to a person with a mild-to-moderate hearing loss or it can denote a deaf person who does not have/want any cultural affiliation with the Deaf community, or both.

dyslexia - 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 problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.” (*Definition of Dyslexia*, n.d.)

fluency - as “being able to speak and write quickly or easily in a given language.” It comes from the Latin word *fluentem* meaning “to flow.” (*What Does It Mean to Be “fluent” in a Language?* 2011)

maintenance - Maintenance is the extent to which the student continues to perform a learned skill after an intervention has been removed.

Organization of the study

In Chapter 1 of my dissertation, I provide information on how the study developed from my experiences and how they shaped the purpose of the study and the research questions. A list of terms with definitions that the reader may find helpful in understanding the dissertation is provided. In Chapter 2, the literature review, I present the background of ASL instruction as a second language and how it compares with second language instruction of spoken and orthographic languages. I examine the effects of dyslexia on second language acquisition and the limited research on dyslexia’s impact on ASL acquisition. A rationale for the use of Cover, Copy and Compare as the intervention used in the research is provided. In Chapter 3, I describe the methodology of the study including descriptions of the participants, setting, and analysis procedures. Chapter 4 answers the research question by reporting the findings from the analysis. Chapter 5 provides discussion and limitations followed by future research implications.

CHAPTER 2

Literature Review

Chapter Organization

This chapter is divided into three sections. Part 1 details ASL acquisition as a second language as compared to second language acquisition of spoken and orthographic language. Part 2 details the effects of dyslexia on second language acquisition. A basis for dyslexia as a linguistic difficulty as seen by challenges in word reading and spelling skills, based on brain research is provided. Part 3 details the use of Cover, Copy and Compare and its effectiveness as a self-managed intervention for repetition of vocabulary and target learning goals.

Part 1: Acquisition of ASL as a Second Language

Historical Context

For the past several years, educators have attempted to identify the best method for teaching ASL, yet some students still struggle learning the language. “Currently researchers and university professors have limited evidence related to how typically hearing adult learners acquire ASL as a second language” (Beal & Faniel, 2018, p. 204). A common misconception outside the Deaf community is the belief that learning ASL is easy and that it parallels English linguistically. ASL’s linguistic structure has been researched and detailed only relatively recently by William Stokoe and his team (Stokoe, 1960; Stokoe, 1995). In the 1970’s and 1980’s, ASL was finally identified as a linguistically unique language because of Stokoe’s research and the publication of the first ASL dictionary (Baker & Cokely, 1980; Valli et al., 2011). Although the same

linguistic elements identified in spoken languages, such as morphology, phonology, syntax, and semantics, are also identified in ASL, these grammatical features are in no way like that of English. Despite these misconceptions that ASL is a form of English, ASL has more linguistic similarities to spoken French Sign Language (LSF) than English. ASL has its origins in French Sign Language. In the early 1800's Laurent Clerc introduced LSF to Thomas Gallaudet, an American, who sought means to communicate with a young deaf girl, Alice Cogswell. Gallaudet journeyed to France after failing to find an appropriate educational pedagogy in England; there he visited the Royal Institute for the Deaf in Paris. At the Institute, LSF was used to teach Deaf students, which resonated with Gallaudet. It was here that Gallaudet learned LSF and he taught Clerc English. The two men eventually sailed to America and established the American School for the Deaf, where LSF was used, and this eventually evolved into the ASL we use today (*American Sign Language and French Sign Language*, n.d.). Because of this partnership, ASL does not follow the grammatical and linguistic features of English as many believe.

ASL Instruction and Acquisition

Teaching ASL as a second language has similarities to teaching other second languages; however, the visual nature of ASL creates unique challenges. Of the terms within "American Sign Language," *Language* is the most complex of the three. It is often defined in terms of communication through words that are heard and spoken. As Ewert detailed, language is "a system of words (groups of articulated sounds) used by a group of human beings to exchange their thoughts" (Ewert, 1933, p. 22). American Sign

Language goes beyond written or articulated sounds and is solely a visual language. This is unique for both the teacher and the learner.

To understand ASL acquisition as a second language, one must look at second language acquisition in its early stages. Language teaching has a long history with contemporary methods being developed in the early 20th century as experts in the field of applied linguistics developed principles for teaching methods. The catalyst for the development of these principles is traced to the need for speakers of a second language as a result of World War II (Richards & Rodgers, 2015). More recently, globalization through technology has prompted a continued need for second language learning. Increasingly, we live in a bilingual and even multilingual world.

Second Language Acquisition Theories

In the field of Second Language Acquisition, the name Stephen Krashen is at the top of the list of scholars. However, he was not the first to establish a theoretical framework for second language acquisition. In the early 1900's Bloomfield and Fries proposed the Audiolingual and Direct Method of language learning (Kirch, 1967). The audio-lingual approach, as the name implies, emphasizes audio-lingual skills over reading and writing. Following World War II, the United States military required linguists to establish a program for fast and easy second language acquisition. The Army Specialized Training Program (ASTP) was established and greatly influenced second language instruction in America. In mid-century, behaviorist theory impacted all areas of learning, including second language learning, and predicted that human behavior could be learned through stimulus response and positive or negative reinforcement (S-R-R), thus making the desired behavior become a habit and eventually occur spontaneously.

Chomsky later challenged this theory with data that did not favor a behaviorist approach in children learning a second language. Regardless of the language, children learn to understand and speak language at extremely early ages. They create language and not just simply imitate their language models. Chomsky called this Language Acquisition Device (LAD). He argued that the process for cognitive development in academic areas did not apply to language learning. Chomsky's research led to a new approach to language acquisition. It was during this time that Krashen took Chomsky's theories on language learning and applied them to second language learning.

Krashen's Theory

Krashen's theory of language acquisition consists of five basic hypotheses; Acquisition-Learning hypothesis, Monitor hypothesis, Natural Order hypothesis, Input hypothesis and Affective Filter hypothesis. When considering language learning, it is necessary to recognize a distinction between learning and acquisition, as defined by Krashen. Learning is receiving information about the language. This information is transformed into knowledge through practice and memorization. Language acquisition is a deeper level in which the learner can interact with, understand, and speak with native speakers of the language. In acquisition there is a natural assimilation of the language, which is the goal in developing a second language. Krashen proposed that acquisition is very similar to the process children use in acquiring their first language (Krashen, 1985).

Acquisition-Learning Hypothesis

The Acquisition-Learning distinction is the most basic of the hypotheses and most commonly used in second language instruction. It states there are two basic ways in which we develop language, acquisition, and learning.

Krashen's Monitor Hypothesis goes further to explain the interaction between learning and acquisition. It defines the influence of learning on acquisition. The learning system is the monitor or editor, in which planning and correcting happen. Learning occurs when there is sufficient time, focus on form, and correctness and knowledge of the rules. The monitor plays a very minor role in language acquisition. Krashen sees acquisition as subconscious learning; therefore, if acquisition is subconscious, then learning is what occurs in the classroom as the teacher makes the student consciously aware of the information. Focusing on acquisition only is a concern in this approach if language is only developed in an unstructured manner and basic rules are left out.

Natural Order Hypothesis

Krashen's Natural Order hypothesis developed as a result of research findings of Dulay and Burt in which they identified 11 functions between Spanish and Chinese children which were virtually the same. Krashen suggests acquisition of grammatical structures follows a natural order that is quite predictable. This natural order is independent of the learner's first language or background conditions.

Input Hypothesis

The Input hypothesis is an attempt to clarify the acquisition of a second language. Focus is solely on acquisition and not learning. The learner improves in a

natural order when the second language input continues to be challenging. The learner should have comprehensible input that continues to be one level higher than the current level. In doing so, the learner is constantly exposed to more language and a level that is challenging. This hypothesis further emphasizes language acquisition without explicit instruction and presupposes Chomsky's LAD. The criticism continues to be the lack of explicit instruction as well as an unclear definition of comprehensible input.

Affective Filter Hypothesis

The final hypothesis is Affective filter which highlights Krashen's view that there are affective variables which play a role in second language acquisition. These non-linguistic variables include motivation, self-confidence, and anxiety (Krashen, 1985). High motivation and self-confidence play a significant role in successful second language acquisition; they equip the learner for success in the face of mental blocks and the urge for first language interference. First language influence is an indicator of low fluency and the learner's tendency to fall back on old knowledge.

These theories were developed and applied to spoken and orthographic languages but also are relevant to the teaching and learning of sign language. Krashen points out the need to use language in meaningful ways and to use it incrementally to not overwhelm the learner. In Krashen's theory, the language does not need to be limited to orthographic or spoken. Although Krashen does not explicitly address signed languages, the theories still apply as ASL shares linguistic features of a language. Perhaps the most relevant of Krashen's theories to this study is the Affective filter. Students who struggle in their first language may enter learning a new language with trepidation. The focus of this study is on learning more so than acquisition, the Affective

filter hypothesis has relevance as interference from the first language and a lack of confidence due to their struggles in their first language can become a roadblock in second language acquisition. By providing confidence in learning aspects of language, based on the Affective filter hypothesis, language acquisition can be positively influenced.

ACTFL and ASLTA Standards

In current teaching of ASL, both the American Council on Teaching of Second languages (ACTFL) and the American Sign Language Teachers Association (ASLTA) published standards for learning ASL in the 21st century. These organizations support teaching and learning of ASL as a second language. The five standards line up with the program standards for second languages that are spoken and orthographic. Called the 5 C's, they lay out what a learner should know and do in the second language. *Communication* is characterized with three modes, interpersonal, interpretive, and presentational. *Cultures* includes three components: perspectives, practices, and products to gain knowledge and understanding of other cultures. *Connections* allows students to connect with other disciplines and acquire information and diverse perspectives in order to use the language to function in academic and career-related situations and expands the educational experience. *Comparisons* allow students to benefit from language learning by discovering patterns among the language systems and culture with both the first and second language and culture. Finally, *Communities* encourages students to develop life-long interest in language and cultures. These same 5 C's are used in ASLTA's Standards for Learning ASL. The difference in teaching ASL and spoken languages is sight versus sound. ASL is a "head-to-toe" language utilizing

the hands, body, face and is received by our eyes. As students begin to learn ASL they are faced with a variety of challenges they could not have predicted, both in the language and the culture. Despite the differences, ASL is a language and can be taught as a second language. The goal is not just learning a second language at a surface level, but true acquisition as seen in Krashen's model.

Applications for ASL

The goal is for the learner to achieve near native-like use of the language, both receptively and expressively. Using Krashen's hypothesis, we can establish a predictable and sequential continuum of learning. In the initial, receptive stage, students can understand new signs and follow basic commands and respond to basic greetings. Expression is very limited at this stage and comprehensible input is in the form of simple phrases. In a second language classroom this is typically a full semester; in a non-academic setting, this can be ten hours to six months (Hong, 2008, p. 61). As the learner begins to respond more frequently, they enter the second stage, early production, and express in the second language using two to three sign phrases. They are also able to respond with yes/no answers. These simple phrases become more complex as they enter the third stage where expressive language is more spontaneous and longer in duration. Dialogue occurs as well as asking of simple questions. This stage can last up to one year and sentences are more complex but often contain grammatical errors. As the learner begins to express their own thoughts and create complex sentences, they are in the fourth stage. Sentences become longer and students ask for clarification. This stage is considered an intermediate level. In most post-secondary settings, a four-semester sequence is allotted for this process (Hong,

2008). Krashen's hypothesis does not fit the current educational paradigm of second language instruction. Educators today often serve as monitors, without allowing for a natural order of language acquisition. Students learn vocabulary and learn basic phrases but rarely become proficient at even an intermediate level (Reagan & Osborn, 2008). A fifth and final stage of language acquisition of advanced proficiency can require a total time frame of up to seven years (Hakuta et al., 2000; Collier, 1987). The individual who reaches this level has a strong and positive affective filter with great motivation and low levels of anxiety related to expressive and receptive language. Understanding how these stages and Krashen's hypothesis relate to the development of a second language is crucial for practitioners. As ASL becomes more widely offered as a second language, the role of Krashen's theories and the characteristics of the language can inform the process of second language acquisition. Krashen's theories can influence the instruction for the learner, providing insight into how the learner responds. Krashen's theory for acquisition versus learning requires meaningful interaction and natural communication and not simply repetitive phrases. Although formal instruction is necessary for grammatical instruction, we must provide opportunities for acquisition and not simple learning. The role of the instructor as monitor is necessary for planning, editing and correcting language. For the learner who is struggling with learning the language or mastering the vocabulary or grammatical structures, the ability to have meaningful interactions and natural communication is greatly impeded.

ASL acquisition is challenging and takes time. McKee and McKee (1992) surveyed 72 college students taking ASL and 12 teachers, six of whom were Deaf and

six were hearing, regarding linguistic difficulties in ASL acquisition, with 1 being easy and 6 being difficult. Both students and teachers rated thinking in ASL, expressing thoughts easily in ASL, and grammar/syntax usage as the top three most difficult features, rating each with a 5or higher (McKee & McKee, 1992). One student commented the most difficult aspect of communicating in ASL was the sentence structure "…leaving out 'the' or 'if', or other small words and where each word fits in the sentence" (McKee & McKee, 1992, p. 135). ASL, as with any language, has challenges and is not an easy language to learn. What happens when a student has a disability? What happens if the disability is dyslexia? As we look at ASL as a second language using Krashen's hypothesis, learners begin with understanding and using new signs. The learner with dyslexia has poor vocabulary development (Hudson et al., 2007). Challenges are present from the earliest stages of language acquisition. As reported by my students, the need for additional input of signed vocabulary was indicated. This is supported by research on dyslexic learners and the need for more direct instruction, repetition, and practice with new vocabulary (Eide & Eide, 2012; Hartas, 2006; *What is Structured Literacy? - International Dyslexia Association*, n.d.)

Part 2: Dyslexia and Second Language Acquisition

Dyslexia

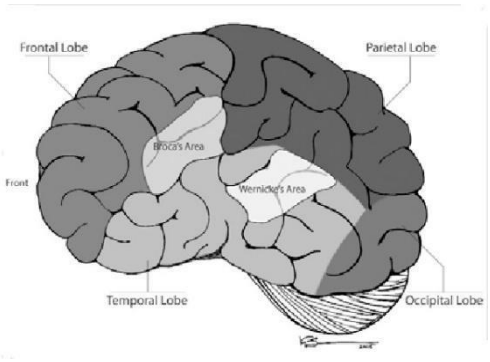
Dyslexia's impact on learning is a complicated subject. Dyslexia was first detailed in Sussex, England in 1896 when W. Pringle Morgan (Shaywitz, 1996) identified a young boy at the age of 14 with a puzzling inability to read. Percy was described as having "always been bright and intelligent…quick at games, and in no way inferior to others of his age." (Shaywitz, 1996, p. 506). Morgan referred to it as being "word blind"

as the young man seemed unable to read the words (Bell & Philippakos, 2020, p. 19) Teachers have often experienced a student who resembles Percy, a student who is bright and articulate but seems to struggle when reading through a written passage that everyone else reads with ease A bright student who struggles with decoding single words or has difficulty reading aloud. This creates questions for teachers. The answers may be found by looking at brain research related to reading problems. Dyslexia is often misunderstood as a lack of the ability to discriminate letters, or of making reversals when reading and writing. However, in examining the parts of the word itself, *dys* means not or difficult and *lexia* means words or language. This literally means difficulty with words or language (Hudson et al., 2007). The belief that the problem is with lexical reversals is a common misconception. These reversals and difficulties with reading letters or words backwards is common as learners develop reading skills. This occurrence does not necessarily indicate there is a problem early on in learning to read (Hudson et al., 2007). The International Association of Dyslexia defines dyslexia as 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 problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (*Definition of Dyslexia*, n.d.).

Because dyslexia is a specific disability in reading, the terms dyslexia and reading disability are often interchangeable. What does research tell us about the brain

and dyslexia? Language processing occurs primarily on the left side of the brain (see *Figure 1)*. The frontal lobe is the largest and controls speech, reasoning, regulating emotions, and consciousness. One area of the left hemisphere, Broca's area, is important for manipulation of language and speech and silent reading proficiency. The occipital lobe found in the back of the brain controls visual perception and identification of letters. The temporal lobe located in the lower part of the brain is critical for language processing and reading. The left parietotemporal system is involved in word analysis, decoding words, and mapping letter sounds (Shaywitz et al., 2002). Finally, the left occipitotemporal area appears to be involved in the formation of words; this is crucial for fluent reading (Shaywitz et al., 2004). Brain research has identified increased activity in the occipital areas in response to print and visual stimuli during typical reading acquisition (Dehaene & Cohen, 2011, p. 258) Functional magnetic resonance imaging (fMRI) which monitors changes in blood oxygenation from neural activity to localize primary sensory and motor areas of the brain has been used to map the brain activity of learners with dyslexia (e.g., Binder et al., 1997, p. 353). Shaywitz (2003) and Shaywitz et al. (2007) found the left occipital-temporal area in learners with dyslexia to be under-active while engaging reading tasks.

A significant difficulty for students with dyslexia is not simply word or letter reversals, though reversals can often occur in the initial stages of learning (Hudson et al., 2007). Dyslexia is a specific learning disorder with difficulties in accurate and fluent word recognition and poor spelling and decoding abilities. These deficits are brain-based and are seen in primarily the phonological aspects of language. Dyslexia is a



Left hemisphere of the brain showing lobes and areas important for language.

Figure 1

specific learning disability in reading which affects 80% of students that have been identified as learning disabled. (Hudson et al., 2007). Much research has been done to determine the areas of the brain that influence reading. The frontal lobe controls speech and reasoning, the parietal lobe links spoken and written language to memory, the occipital lobe controls visual perception important for letter identification and finally the temporal lobe is involved with verbal memory and the most critical in language processing and reading (Hudson et al., 2007).

Specifically focusing on the reading process, there are two major components: decoding and comprehension--both of which are controlled in Wernicke's area located in the lower part of the brain (Shaywitz, 2003). Many students with dyslexia experience a phonological weakness resulting in decoding and word identification problems. We see this as a lower-level language function. Without decoding, a student cannot identify words and in turn cannot establish meaning for comprehension. Brain research indicates less activity in the posterior system on the left side of the brain in readers with dyslexia, so it utilizes other pathways. Learners with dyslexia also use alternate areas of the right and front sides of the brain, resulting in a disruption to automatic word recognition (Shaywitz, 2003). In addition to this disruption, the lack of automaticity effects reading fluency and as a result, comprehension. The ability to understand and manipulate individual sounds and units of spoken language as well as rapid automatic naming are the primary cognitive correlates of dyslexia (Wolf & Bowers, 2000). Reading comprehension will be affected as a student focuses on decoding rather than understanding the text. This automatic processing or automatic naming has been identified as a contributor to, a defining characteristic, of learners with dyslexia (Bruck,

1992; Wolf & Bowers, 2000). When a student with dyslexia is learning ASL, this lack of automaticity can impact the ability to recall specific signs.

Dyslexia and Second Language Acquisition

In the area of second language (L2) fluency, educators maintain that second language aptitude is directly linked to first language (L1) proficiency in sound discrimination and manipulation along with grammatical structures (Miller-Guron & Lundberg, 2000). Sparks et al. (2009) found that successful second language learning is linked to phonological, orthographic, and syntactic skills in the first language, but native language skills of reading, spelling and vocabulary were not linked to L2 semantic abilities. When a learner with dyslexia struggles with phonological, orthographic, and syntactic skills in their first language, we will see the struggles in second language acquisition. Students with poor skills in the L2 have poorer self-perceptions and higher anxiety because of L1 deficits (Sparks et al., 2009). The affective filter mentioned previously with Krashen's language acquisition is seen in the learner who has struggled with L1 can experience anxiety in L2. What can be determined is there is an impact on second language acquisition. If a native speaker of the language, including students with dyslexia, struggle in reading text in their native language and have low automaticity, they will likely experience less fluency and lower automaticity in the second language. Spolsky (1989) identified several conditions for successful L2 acquisition and emphasized that "any physiological or biological limitations that block the learning of a first language will similarly block the learning of a second language" (Spolsky, 1989, p. 89). For students with dyslexia, deficits in

phonological processing, poor working memory, poor auditory discrimination, struggles with syntax and auditory sequencing will impact the effectiveness of L2 acquisition. The struggles in the first language will be present in the second language which increases the anxiety levels and self-perceptions of learning a second language.

Looking specifically at L2 instruction in the educational setting, there is great variability in the proficiency students attain. Sparks, et al (2009) identified aptitude as a strong contributor to second language acquisition in both expressive and receptive skills. Sparkes, et al, identified aptitude based on scores from the Modern Language Aptitude Test (MLAT) including phonetic coding, the ability to handle grammar, the ability to infer linguistic forms, and the ability to learn phonetic and grammatical associations (2001). Additional findings indicate memory of L1 text to be a strong predictor of L2 vocabulary knowledge and comprehension for school aged children in an intensive L2 program (Harley & Hart, 1997). Again, memory and recall appear to be indicators of L2 acquisition but also are areas of deficit for learners with dyslexia.

A significant challenge for identifying the needs of second language acquisition for students with dyslexia is identifying if the challenge is a result of the challenges of L2 learning or the challenges of dyslexia itself. We are faced with a complex diagnostic challenge which leads to the challenge of developing interventions.

Language proficiency can be identified at the very basic structural level of phonology and semantics. Phonology relates to the production of language, using correct pronunciations. This is a very basic level of proficiency and can often be acquired in a short amount of time (Lundberg, 2002). Reaching a high level of proficiency in which one can use language with depth and develop an understanding of

the meaning of words, metaphors, idiomatic expressions, and pragmatic effectiveness can take several years. Language learning happens on this continuum of contextualized language that is characterized by references to time, place or person and decontextualized communication, language that is more varied and with more abstract and complex words. We must consider proficiency in two or more languages in terms of the structural dimension of phonology and semantics as well as contextualization. As this study focuses on learning a language, the need for fluency in phonology is relevant to eventual acquisition of language. By improving structural dimension of the mechanics of language, learners can build on the structural dimensions of language meaning and thus, language acquisition. Language is very nuanced and is dependent on the context. When a learner has proficiency in the mechanics, they can develop the nuances of the context. There is a broad level of repertoire, gestures, intonation, facial expressions that increase the contextualization of the message. All must be considered in language acquisition. These nuances impact the meaning and with improper use or comprehension, the message is lost or distorted. Decontextualized language skills may be critical to successful second language learning (Davidson et al., 1986).

In addition, the timing of learning a second language has an impact. Some research has shown that older learners are able to acquire a second language better due to their cognitive maturity (Lundberg, 2002). However, the phonological and prosodic aspects of a second language can be acquired with more ease at an earlier age (Lundberg, 2002). Evidence does suggest it takes 250 to 500 hours of instruction to achieve a comfortable level of fluency (Saint-Jacques & Diller, 1985). The question remains, how does the additional challenges of dyslexia affect second language

acquisition? There is an advantage for younger children for the phonological aspects that characterize learners with dyslexia, including older learners with dyslexia. Baddeley proposed a model of working memory where a phonological loop has a significant role (Lund, 2002). A leaner with poor working memory or automaticity in recall may encounter difficulties in acquisition of vocabulary in the L2.

Students with dyslexia often report difficulty maintaining the pace of a second language class or the inability to understand the teacher (Downey et al, 2000). Often, they report confusion identifying where a word begins or ends in the spoken second language. They find their struggles in spelling and pronunciation in their first language confound writing and spelling in a new language (Downey 2000). Some studies suggest a major obstacle in second language acquisition is overcoming the learned habits of the first language (Elbro, et al 2012; Lundberg, 2002). For learners with dyslexia, this can present a unique challenge as many have developed sophisticated strategies for learning material in the first language that are not always effective in a foreign language classroom. Learners with dyslexia have developed strategies such as word attack skills of blending and letter-sound learning as it relates to decoding in L1. These strategies may not be applicable to the phonemic and semantic aspects of the L2. Although they may have learned to compensate for the difficulties, the phonological deficits in the L1 can continue to impact higher level language tasks found in narrative and reading comprehension. The demand for rapid sound/symbol associations necessary in the second language classroom presents an even greater challenge for learners with dyslexia. In addition to the deficits in the first language impacting the acquisition of a second language, “factors such as phonology, grammar and syntax of the second

language can cause different manifestations dependent on the patterns and degrees of dyslexic difficulties" (Crombie, 2000, p. 113). Crombie's study involved students with dyslexia in Scotland while studying French. It was noted that dyslexic learners might find another language that is orthographically similar to English easier to learn, such as Spanish or Italian which is similar on phonology to English, than a language with a different orthography.

An additional impact on second language acquisition for learners with dyslexia is motivation. Horowitz, et al found that foreign language courses can produce more anxiety for persons with dyslexia than courses of other disciplines (Ewald, 2007). Whether this anxiety is from an inner dialogue of self-doubt or the actual classroom itself, there is an adverse effect on the learner. Researchers have identified negative reactions of concentration difficulties, forgetfulness, lack of comprehension, heart palpitations and even a complete inability to perform (Ewald). These negative reactions when combined with struggles in the learner's first language, there is the makings of failure.

When we consider second language learning for students with dyslexia, we must also consider the research findings indicating automatic recall as a strong predictor of fluency and a greater challenge for this population. Wolf identified naming-speed deficits in the L1 as an indicator of fluency and comprehension problems in early learners. Although it can be difficult to identify with certainty in early years, these learners develop problems by the end of 3rd grade (Wolf & Katzir-Cohen, 2009). Wolf and colleagues described "the Double-Deficit Hypothesis" in which phonological deficits and naming

speed deficits are sources for reading dysfunction (Wolf & Bowers, 2000). These struggles in the early years can impact acquisition of a second language in later years.

Language learning involves both objective and affective factors. When we look at learners with dyslexia and second language acquisition, a high affective filter, as previously discussed in Krashen's theories, can block the input of language. This affective filter does not impact first language acquisition, but it plays an important role in acquiring a second language. Krashen mentions four factors in his Affective Filter hypothesis that can influence second language acquisition. When we look at these factors as they relate to dyslexia, we can see the impact of the struggles these students have with their first language learning on second language learning.

Motivation

Most researchers would agree that motivation plays a role in second language acquisition. Gardner (1985) defined motivation to learn as "the extent to which the individual works or strive to learn the language because of a desire to do so and satisfaction experienced in this activity." (Du, 2009, p. 162). With the known struggles associated with dyslexia, the motivation to learn a second language can be equally low. If the motivation is integrative, meaning the learner is interested in the second language and willing to participate, there can be greater success. However, If the motivation is only instrumental, meaning the learner only needs to pass a test, it can be less likely for success.

Attitude

The learner's attitude can determine the progress of L2 acquisition. The more positive the attitude, the greater the progress. Attitude also influences class participation which increases the success of L2 acquisition. Often for learners with dyslexia, the attitude towards language learning is not positive as their experiences with language learning has not been positive. (Kormos et al., 2009; Simon, 2000) Their commitment to learning can be passive and lacking in the persistence needed.

Anxiety

Gardner and MacIntyre (1993) see language anxiety as "the apprehension experiences when a situation requires the use of a second language with which the individual is not fully proficient." (Du, 2009, p. 163). This anxiety creates a barrier and can be seen in both cognitive and physical ways. It can be characterized by "derogatory self-related cognitions…and physiological responses such as increased heart rate" (Gardner & MacIntyre, 1993, p. 4).

Self-confidence

Finally, what might be the most important factor is self-confidence. It is with self-confidence that students dare to try, to communicate in a second language, to not fear making mistakes or embarrassment. Self-confidence allows a learner to take the risk that will pay off with successful communication in the second language.

To address these affective factors, teachers must motivate learners with diversified teaching to address these levels of anxiety and allow the learners to experience success in the second language. It is important to provide a foundation for

learning. As learners with dyslexia have a weakness in working memory, it is important to provide additional opportunities to engage within the second language. Learners with dyslexia will need specific and targeted opportunities to retrieve information in the target language. Self-regulated strategies can reduce the load of working memory by providing steps in which the learner can improve recall and use of the second language (Hebert et al., 2018). Providing the foundation for learning a second language can enable the learner with dyslexia to feel a sense of control and success minimizing the impact of a high affective filter on learning.

Dyslexia and ASL

As we look at second language acquisition, specifically American Sign Language, the ability to recall signs and “read” signs, or attach meaning to the signs that are viewed, are required skills for effective communication. We must look at language acquisition as it relates to dyslexia as well as the impact on generalization of skills in both receptive and expressive language. Research shows cerebral functions of the brain and ongoing myelination in Broca’s area and the cortex required for language learning can be affected by dyslexia. Research in second language acquisition can help identify areas where the brain stores and retrieves linguistic knowledge as well as how the brain adapts to linguistic burdens from learning disabilities.

Areas that have been identified as challenges to learners with dyslexia such as word recall, and automatic naming may also impact acquisition of American Sign Language (ASL). There has been much research dedicated to dyslexia, but research on its impact on sign language learning is lacking.

The only published study directly related to dyslexia and sign language acquisition was conducted in Britain using British Sign Language (BSL) and American Sign Language (ASL). Moffatt-Feldman (2015) completed a study aimed at identifying struggles of individuals with dyslexia learning sign language. Moffat-Feldman explored the perceptions and experiences of individuals with dyslexia while learning sign language. Sign language learners had reported struggling with fingerspelling comprehension, which led to the need for the dissertation, along with a lack of research in dyslexia and sign language learning. Seven participants ranged in age from 21 to 69. Five participants were learning BSL and two were learning ASL. The study focused on language anxieties, and any disadvantages to learning sign language and fingerspelling.

In addition, Moffat-Feldman compared users of American and British sign language systems. Both qualitative and quantitative data were collected. Participants were administered the Wide Range Achievement Test 4 (WRAT4) Single Word Reading and Spelling tests (Wilkinson & Robertson, 2006) both in English and sign language as well as questionnaires designed to answer questions about participants' learning experience and language anxieties. The WRAT4 is used to measure academic ability needed for effective learning, communication and thinking and produces a raw score that is converted to standardized scores using age-appropriate tables (Moffatt-Feldman, 2015, p. 27). The questionnaire included 21 questions, some of which pertained to feelings toward the first language and preference to sign language. Questions also pertained to left- or right-hand dominance and preference towards fingerspelling. There were additional questions regarding phonics and reading, both before learning sign

language and after as well as questions pertaining to perceptions in the classroom compared to peers and comfort and confidence levels in learning sign language (Moffatt-Feldman, 2015, pp. 103–104).

Results indicate that individuals believed dyslexia created a clear disadvantage in the comprehension of fingerspelling, and that reading words in English was easier than reading fingerspelling. The WRAT4 standardized Single Word Reading and Spelling tests allowed comparison of performance when using sign language versus English use. Results showed every participant had a lower score for single word reading in sign language than in English. These results demonstrate a significant difference in achievement in English and sign language. Participants who took part in the research reported that when reading English words, letters could be viewed simultaneously aiding recall of spelling patterns. Results indicated a “clear disadvantage in the comprehension of fingerspelling” (Moffatt-Feldman, 2015, p. 1) based on qualitative results of participant questionnaire. The comprehension of sign language fingerspelling is difficult for individuals with dyslexia seemingly due to the letters being consecutively produced.

Comparisons were made between BSL and ASL acquisition with a focus on anxieties due to perceived disadvantages regarding learning sign language and using fingerspelling. The available sample size of ASL users was not equal to the sample size of BSL users nor was it representative of the population and results were not published; however, the researcher stated the limited comparisons warranted further investigation. Another significant limitation of this study is the focus on fingerspelling and not expressive and receptive fluency. This study focused on learners with English as a first

language both in Britain and the U.S. Although both countries have English as the predominant spoken language, ASL and BSL are completely unrelated to spoken English and to each other (Moffatt-Feldman, 2015). ASL and BSL have their own grammatical structures, syntax, and semantics. The linguistic features of each are unique. Both have “manual dactylology” or fingerspelling. ASL uses one hand to represent the 26 letters where BSL uses a combination of both hands to represent all letters. Research identified 2.5% of discourse in BSL is fingerspelling where ASL uses 6.4% of discourse in fingerspelling (Moffatt-Feldman, 2015).

In the quantitative analyses of this research, the Wide Range Achievement Test 4 (WRAT4) was used to assess differences in single word reading and spelling in English versus B/ASL. It should be noted that the original plan for this study was to include participants studying BSL only. After five assessments, a clear pattern emerged in which every participant scored lower in BSL than English. The decision was made to add ASL as part of the study to broaden the scope of the study. The WRAT4 consisted of four phases and a post assessment. Independent variables were identified as the use of B/ASL, the dependent variables were identified as the single word readings and spelling scores resulting from the WRAT4 test. The WRAT4 spelling test and single word reading test were administered in English and then modified to be administered in B/ASL. Results indicated participants believed there was a clear disadvantage in developing fingerspelling skills both expressive and receptive, meaning they struggled with both reading fingerspelling and fingerspelling words themselves. Specifically, participants identified the reception of fingerspelling as the challenge. They identified the consecutive nature of fingerspelling was impacted by the weakness in processing

and working memory and the longer the word the more information had to be held in working memory. When surveyed, 71.43% of the participants indicated that dyslexia had a negative impact on their fingerspelling ability and 60% commented that reading English was easier than reading fingerspelling. As a visual language, the lack of auditory input lessens the pathways to the brain to store and recall the information. An additional limitation to the study was the modified administration of the WRAT4 in sign language and therefore the raw data could not be standardized. The order in which the WRAT4 was administered provided repeated exposure to the stimuli so the participants had effectively seen the words twice, once in sign language and once in English. These results cannot be relied upon and it was expected that their score would improve by the second administration of the test. However, the scores for single word reading and spelling were lower in sign language than in English. These findings can serve, at best, as a guide for future research given the overall limitations of the study. Not only were there limitations in the testing, limitations for ASL learners was significant having only two participants who were learning ASL. The study also focused on the orthographic aspects of English and attempted to make a comparison to Sign Language. There was no mention of the rapid automatized naming difficulties or other brain functions as it relates to dyslexia. Despite the limitations, the study findings suggest there is a negative impact of dyslexia on sign language acquisition. This finding, however, is limited to fingerspelling due to the nature of the study and may not be generalized to recall of signs. As this is the only research specific to dyslexia and sign language acquisition, further research is needed.

Research showing the impact of dyslexia on hearing learners of sign language is extremely limited, and research showing the impact of dyslexia on native speakers of signed language(s) is even more sparse. A pilot study was conducted in the spring of 2017 investigating the effectiveness of a self-managed intervention on ASL acquisition for students with dyslexia. Cover, Copy and Compare was used in a modified format using video recording to provide accurate modeling of target vocabulary to college-age students with dyslexia. Two hearing participants who were currently in their fifth semester of ASL classes and who had been diagnosed with dyslexia in grade school completed three weeks of intervention. Results indicated an increase in recall of signs as well as self-reported improvement in confidence levels in learning ASL. The pilot study had limitations with the level of student participants as well as the quantity. The two participants were advanced students who had struggled with expressing themselves in ASL for a total of five semesters. Both entered the study reporting preconceived ideas and ineffective coping skills for learning ASL. The pilot study also had errors in its implementation with incorrect baselines with the small population. Although participants were assessed on all target vocabulary with each implementation of intervention, a stable baseline of at least three data points was not established prior to implementation of the intervention. The goal of the current study is to examine with greater validity the effectiveness of CCC as an intervention for students with dyslexia learning ASL.

PART 3: COVER, COPY AND COMPARE

CCC Method

Cover, Copy and Compare (CCC) has been widely used across learners and content areas as an effective strategy for self-managed learning (Skinner et al., 1997). CCC uses three simple steps: the student views stimulus such as a spelling word, the student covers the stimulus and makes an academic response by copying the spelling word, the student uncovers the stimulus and compares their response for accuracy Effective instruction in spelling and spelling practice is often seen as monotonous, but it is an important skill which impacts clarity in writing, verb morphology, writing fluency, early reading development, and student perceptions of writing ability and expression (Nies & Belfiore, 2006). Nies and Belfiore (2006) indicated CCC is not only motivating but an effective and efficient strategy for spelling instruction. At the heart of CCC is the ability for students to compare their responses and self-evaluate and self-correct. In the single subject design study by Nies and Belfiore, two students were given the CCC strategy for half of the stimuli and a copy only strategy for the other half. Not only did both students learn more new words each week but they retained 95% of the words using all components of CCC as compared to only 64% using the copy only strategy. In addition to the increase in words read and retained, students reported a preference for CCC as an intervention strategy. Preference is critical to increase the likelihood of student motivation and continued use of the program. One of the key components of CCC, the immediacy of self-evaluation and self-correction, increases motivation, and as a result, the success of the intervention.

McGuigan (1975) and Hansen (1978) were among the first to use CCC procedures to help students improve spelling performance. The techniques were later modified to help students improve math skills focusing specifically on multiplication skills (Joseph et al., 2012). Variations and uses of CCC have continued to be applied in a variety of settings with a variety of learners. A meta-analytic review of CCC completed in 2011 identified 31 studies, including both single subject design or group experimental/quasi-experimental design, from peer reviewed journals across students of all ages, with and without disabilities (Joseph et al., 2012). In reviewing the studies that involved the teaching of spelling, 17 studies were identified with 115 participants. The researchers calculated percentages of nonoverlapping data (PND) for those studies that reported individual data points. They noted the highest baseline points and all intervention data points that exceeded the highest baseline points. The then divided that by the total number of points in the intervention phase and converted it to a percentage (Scruggs et al., 1987). The results showed CCC along with modified versions of CCC have an average PND of 73.0 with PND of 70-100 indicating effectiveness. Modified versions of CCC included peer-delivered CCC, CCC with another strategy, and model-copy-cover-compare (MCCC). Social validity measures revealed that students across the studies indicated the procedures helped them be better spellers and that they would use this method in the future. As previously stated, CCC is effective across learners and content; however, very little research is available specifically addressing CCC's use with students with dyslexia or reading disability.

Above spelling, we recognize reading as a fundamental skill taught in schools today. Much of what makes a fluent reader are the phonological and orthographic skills

that also impact spelling. Poor reading skills have been linked with dropout rates, behavior problems, and under employment as well as unemployment (Kaufman et al., 2011). When students lack the skills to gather important information by not reading fluently, learning is limited. Quick and fluent word identification is crucial to effective reading. The ability to read words automatically allows one's cognitive resources to be used for comprehension. Research has shown that learners with dyslexia struggle with automatic recall (Shaywitz, 2003) and thus need further opportunities to build these skills. Increasing reading fluency allows a student to have control over their learning and environment to read information in both the academic environment as well as social environment. Kaufman, et al. (2011) examined if CCC could be an effective strategy to teach sight words to three students with learning disabilities in reading. One participant struggled using Reading Racetracks as the intervention for this study. For the final session, the research team began using CCC. The researcher carried out the steps for Reading Racetracks and used the words the participant scored incorrectly to carry out the steps for CCC. These words were read twice for the participant as part of the CCC intervention. A reward system was also implemented due to the participant's struggles completing Racetracks. Upon completion of Racetracks, the participant was allowed five minutes to draw in his notebook. Prior to using CCC, the participant read 13 words per minute with 3.75 errors. After using CCC+rewards, the participant read 21 words correctly per minute with no errors. Although the authors did not indicate specifically why this participant struggled with the original intervention, it was noted that there seemed to be a lack of motivation. As previously stated, practice to increase fluency can often be mundane, CCC is well documented to provide quick and efficient opportunities

to improve academic performance. Because of its self-managed aspect, CCC provides students the ability to control their learning and have ownership in their success.

CHAPTER 3

Methods

Chapter Organization

In this chapter, I briefly review the purpose and significance of this study. Descriptions of the setting, participants and their selection, and the data collection and analysis are provided. Procedures are explained including participant recruitment and intervention training.

Research Questions

The following research question was examined in this study.

1. Is Cover, Copy and Compare an effective strategy for acquisition of ASL vocabulary for students with dyslexia?

Background

This dissertation is a result of experiences within the post-secondary ASL classroom with hearing students as second language learners. Students who self-disclosed having dyslexia or as having a learning disability and did not respond positively to prescribed accommodations provided the impetus for devising an intervention that specifically addressed their deficits.

Purpose

The purpose of this study is to investigate the effectiveness of Cover, Copy and Compare as an intervention for students with dyslexia who are learning ASL as a second language.

Participants

The participants for this study were individuals 18 years of age or older. Inclusion criteria for participants included: (1) documentation of a diagnosis of dyslexia or a reading disability or disorder, and (2) limited or no prior knowledge of ASL. Participants provided documentation of dyslexia (or a specific leaning disability/disorder in reading with difficulties in basic reading skills, and/or reading fluency and/or spelling difficulties) (Bell & Philippakos, 2020). Documentation of dyslexia or specific learning disability relies on standardized testing in the areas of reading accuracy, speed and comprehension, written expression, math fluency and other relevant areas of performance. Each participant provided copies of psychoeducational testing and/or special education records; relevant results are shown in Table 1. The participants all had Intelligent test ores in the average range or higher (low average to superior), based on psychoeducational documentation provided. That is, they all earned full scale or global scores on intelligence tests in the broad range of average range or better. They all exhibited limited knowledge of ASL, described as no exposure to minimal exposure of fingerspelling and up to five common signs. Each participant was given a pseudonym for the duration of the study and all subsequent dissemination of the findings.

Rey. Rey, a 21-year-old female, in her senior year of college, achieved an overall cognitive ability score of 114, which is in the high average range of intellectual abilities. Rey was homeschooled for her elementary and high school years. As a result of being homeschooled, Rey reported she received an individualized education that met her learning needs. Test results indicate a specific learning disability in Written Expression, Reading and Spelling.

Lyndsey. Lyndsey, a 20-year-old female in her sophomore year of college, achieved an overall cognitive ability score of 88, which is in the low average range of intellectual abilities. Lyndsey was homeschooled during her elementary years and received special education services (consultation services by a special education teacher) in high school. Test results indicate a specific learning disability in Basic Reading, Reading Comprehension and Written Language.

Nick. Nick, a 54-year-old-male, in a master's degree program, achieved an overall cognitive ability score of 121, which is in the superior range of intellectual abilities. He has earned a degree in geography and social studies education. Nick recalled receiving learning support services in high school which included extended time on assignments and tests. Test results indicate a specific learning disability in Written Expression and Basic Reading Skills.

Serena. Serena, a 23-year-old female, in a master's degree program, achieved an overall cognitive ability score of 119, which is in the high average range of intellectual abilities. Serena attended a private k12 school where she received educational accommodations including additional time for tests and exams. Test results indicate a specific learning disability in Basic Reading, Written Expression and Spelling.

Setting

As a result of COVID-19, researcher and participant interactions were carried out using Zoom. Zoom is a web-based video conferencing tool that allows individuals to meet online using video. Participants were provided with the lead researcher's virtual office using Zoom.

Table 1

Participant Characteristics

Participant	Age	Area(s) of Cognitive Strengths	Area(s) of Cognitive or Processing Difficulty	Area(s) of Academic Strengths	Area(s) of Academic Difficulty	Accommodations
Rey	21	Verbal Comprehension, Verbal Expression, Working Memory	Visual-motor Processing, Delayed recall	Math Problem Solving, Vocabulary	Spelling, Reading Fluency, Handwriting, Math Fluency	Extended Time, technology for handwritten assignments, spellcheck for exams.
Lyndsey	20	Verbal Comprehension,	Working Memory, Processing Speed, Phonological Processing	Listening Comprehension, Receptive Vocabulary	Reading Decoding, Reading Comprehension, Reading Fluency, Spelling	Extended time, alternate test settings, preferential seating
Nick	53	Verbal Compression, Verbal Expression, Perceptual Reasoning	Processing Speed	Written Expression, Math Fluency	Basic Reading Skills, Phonics, Reading Fluency, Spelling, Writing Fluency	Extended time, alternate test location, speech to text software
Serena	23	Verbal Comprehension, Perceptual Reasoning,	Visual Motor Coordination, Processing Speed	Vocabulary, Listening Comprehension; Broad Math Skills	Phonics, Spelling, Reading Rate, Basic Reading Skills, Phoneme-Grapheme Knowledge	Extended time, alternate test settings, written and oral instructions, preferential seating, dictation, and electronic readers

Materials

Materials used in this study included a stopwatch, index cards, word lists, signed videos, GoReact access, and data sheets. The CCC intervention is a multimedia format with videos for each set of words accessed individually through the online program GoReact. GoReact consists of split screens of the stimulus and the participant's responses. Data sheets consisted of 30 vocabulary words with columns to record responses for each assessment (See Appendix B). The selected vocabulary words were placed on individual index cards for use during assessments. These cards were used during zoom meetings prior to intervention to first establish baseline and then carry out probes for data collection. (see Figure 2)

The signed vocabulary words chosen for the study were taken from Dawn Sign Press Signing Naturally Unit 1 (Mikos et al., 2001). Words were randomly chosen from the curriculum's list of explicitly taught vocabulary (see Appendix C). Videos were created using a native signer signing each of the 30 words selected. Each clip was edited to include the English equivalent at the top of the screen. For each word a 12 second clip was created as a learning trial in which the native signer signs the word

Probes

Note: Data collection probes occurring during Zoom meetings

Figure 2

The native signer repeats the sign for 3 seconds with the English equivalent at the top of the screen. Last, the screen is blank with only the English equivalent at the top of the screen for 3 seconds. The learning trial is repeated for all 30 words (see Figure 3). The 30 words are divided into 3 sets of 10 words each. Three videos were created for each set, with a presentation of the 10 words occurring in a different order on each video (See table 2). The videos were used in a random order for each phase of the intervention. This process was repeated for sets 2 and 3 of the original vocabulary list. The videos were uploaded to GoReact, and user accounts were created for each participant.

Design

A multiple baseline across sets design was used to evaluate the effectiveness of this intervention. This design allows the researcher to improve skills by staggering the treatment. Because the treatment starts at different times, one can conclude that the changes are due to the treatment and not by chance. True baselines are established for each target behavior allowing the researcher to evaluate effectiveness of the intervention. After a change has been observed, in the case of this study, a positive upward trend, the next set is introduced. While intervention is carried out for this set, data collection continues for both sets. By collecting data from several participants over multiple sets, with staggered treatments, a generalization can be made regarding effectiveness to the greater population (Morgan & Morgan, 2009). This design controls for threats to internal validity by providing an opportunity for more than three demonstrations of a treatment effect.

Learning Trial Clip

Note. Sample of a single vocabulary of a learning trial

Figure 3

Table 2

Learning Trials Randomized Videos Set 1

Video 1 A				Video 1 B				Video 1 C			
3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec	3 Sec
Man	Man	Man	Man	play	play	play	play	exercise	exercise	exercise	exercise
paint	paint	paint	paint	Watch TV	Watch TV	Watch TV	Watch TV	paint	paint	paint	paint
play	play	play	play	woman	woman	woman	woman	Man	Man	Man	Man
Watch TV	Watch TV	Watch TV	Watch TV	exercise	exercise	exercise	exercise	woman	woman	woman	woman
exercise	exercise	exercise	exercise	paint	paint	paint	paint	play	play	play	play
forget	forget	forget	forget	Man	Man	Man	Man	Watch TV	Watch TV	Watch TV	Watch TV
church	church	church	church	forget	forget	forget	forget	shop	shop	shop	shop
shop	shop	shop	shop	church	church	church	church	church	church	church	church
woman	woman	woman	woman	Monday	Monday	Monday	Monday	Monday	Monday	Monday	Monday
Monday	Monday	Monday	Monday	shop	shop	shop	shop	forget	forget	forget	forget
exercise	exercise	exercise	exercise	Man	Man	Man	Man	Man	Man	Man	Man
paint	paint	paint	paint	paint	paint	paint	paint	paint	paint	paint	paint

Table 2 continued

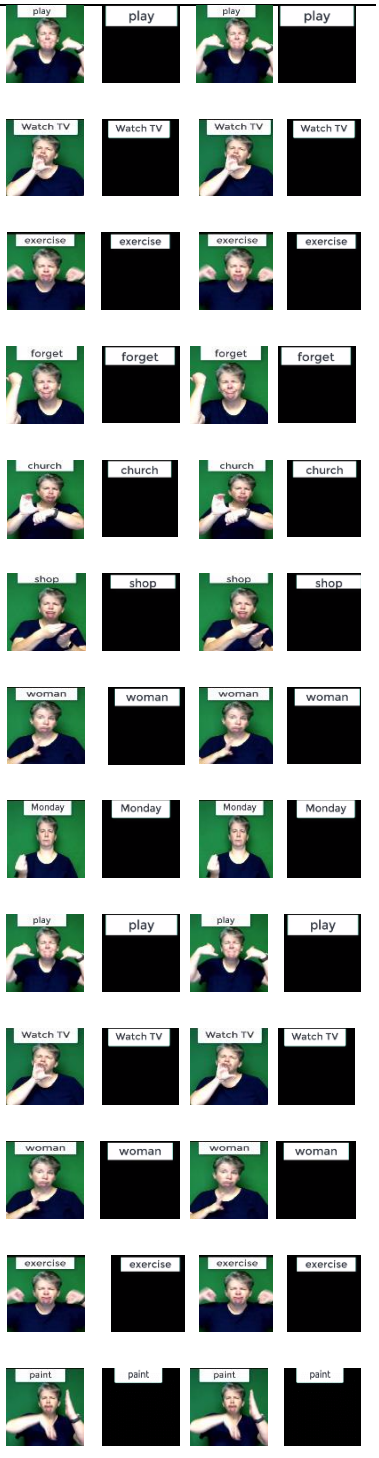
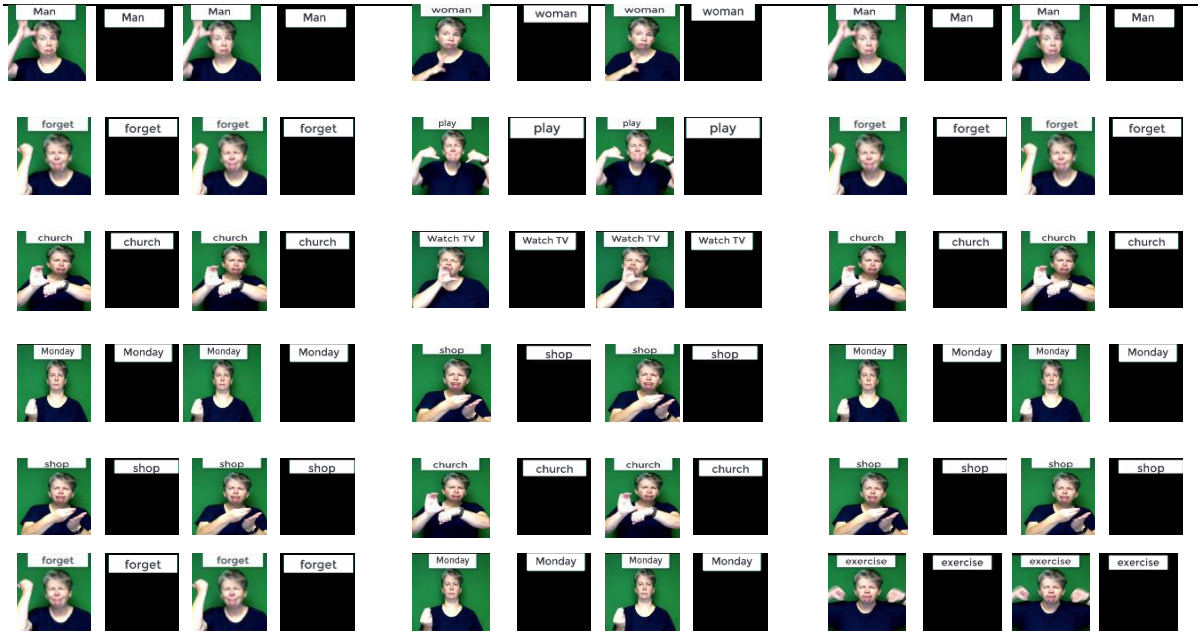
Video 1 A	Video 1 B	Video 1 C
		

Table 2 continued

Video 1 A	Video 1 B	Video 1 C
		

Note. 3 different videos were created with each word presented a total of 3 times in each video. Words were randomized for each video. If participants went beyond 3 sessions, videos were rotated so as not to repeat the same video 2 sessions consecutively.

Participants who met inclusion criteria and had signed consent were placed in the baseline phase and were assessed on three sets of vocabulary. They were shown the index cards and asked to sign the vocabulary words. Participants remained in baseline phase for three days until a stable flat trend emerged for these three data points. After this stable trend was established, participants began the intervention phase with the first set of vocabulary words. Multimedia CCC was used during the intervention phases. After a minimum of 3 sessions with an upward trend identified by visual analysis, the intervention for the next set of vocabulary was introduced. Once an upward trend with a minimum of three data points was established for the second set of vocabulary, the third set of vocabulary was introduced. When an upward trend of 3 data points was established for set 3, data collection was complete for this study.

Variables.

The dependent variable was the number of vocabulary words signed correctly during each probe. Participants were assessed at the beginning of each session prior to intervention and results were documented on the data sheets. An item was considered correct when signed and understood within 3 seconds of the word being presented on index cards and correctly produced based on the five parameters of ASL (Valli et al., 2011). For example, if the word father was presented and the participant signed FATHER using correct placement, palm orientation, and movement within 3 seconds, the item was scored as correct. If the participant signed with correct placement and palm orientation but incorrect movement by moving their hand to their chest indicating MAN, the item was marked as incorrect. If the participant signed with correct palm orientation and movement but had the placement at the chin for MOTHER, the item was

scored incorrect. If the participant signed with correct placement and movement but incorrect palm orientation facing forward to indicate FIREMAN, the item was scored incorrect.

The independent variable was the Multimedia CCC intervention. The intervention consisted of a stimulus video created by a native signer which included 10 signs with the English equivalent captioned above. Multimedia CCC allowed the participant to copy the native signer after the signer presented the stimulus in ASL. Participants logged in to GoReact and opened the stimulus video. Upon completion of all 10 signs presented a total of 3 times, each time in a different order, the participant closed and saved the completed intervention video. GoReact allows the researcher to view the completed videos immediately following completion to assess for any technical issues or problems with intervention completion. Words were presented in a different order for each session of intervention. (See Table 2)

Procedures

Participant Recruitment

Participants for this study were recruited through the disability offices of three universities in the southeast portion of the United States. The offices provide services for participants with disabilities as determined by the Americans with Disabilities Act regulations. Additional recruiting was done through a university-based center that provides psychoeducational assessments to the public, including assessments for learning disorders. A summary of the intended research was provided to the disability office and center personnel, who then disseminated the information to potential participants. Interested individuals were asked to contact the lead researcher for further

screening to meet eligibility requirements (See Appendix A). Participants provided documentation of dyslexia or reading disability with difficulties in basic reading and/or reading fluency and/or reading comprehension and/or spelling difficulties and a signed participant consent form.

Virtual Accommodations

Participants were provided with the lead researcher's virtual office on Zoom. An initial session was scheduled to allow participants to become comfortable with using virtual meetings and accessing both Zoom and GoReact; the researcher answered any questions they had. Participants logged in to GoReact and viewed an introduction video explaining proper video frame, lighting, and internet speed. This allowed the researcher to assess the quality of the participant's recordings. Also, during the first session, the participant was given the pre-test of 30 ASL vocabulary words. During each baseline session, after baseline data were collected, participants left the Zoom meeting and logged into GoReact, viewed a video explaining the steps of the intervention and completed intervention training. Once intervention phase began, participants received an email from the lead researcher with instructions, a link for the virtual Zoom meeting room and GoReact, and log-in information for GoReact (see Appendix B). During intervention phase and upon completion of data collection, the participant left the Zoom meeting room and logged in to GoReact. The participant only saw the intervention set for that day and carried out the intervention. GoReact allowed the lead researcher to view when the intervention was complete and view the live status of the recordings. This allowed the researcher to immediately view each phase of intervention and confirm

completion of each phase. Participants had access to the lead researcher's phone and email for any additional assistance.

Pre-test of ASL

Prior to the first day of data collection, each participant confirmed they did not know the ASL equivalents to the chosen English vocabulary. Participants' prior knowledge of ASL was assessed using the vocabulary list derived from Signing Naturally unit 1. Flashcards were used to assess prior knowledge of ASL signs. Any signs participants were able to correctly produce were eliminated from the target vocabulary list. Participants may have been exposed to fingerspelling or know up to 5 common ASL signs but have very limited ASL exposure. At this time, participants agreed to not practice signing the words or have any exposure to ASL separate from the intervention.

Intervention Training

In order to train participants on the accurate use of GoReact, three words were chosen, and a sample video was created for participants to become familiar with the process. Each participant followed the steps for logging in and opening the appropriate video. They asked questions about the procedures and became comfortable using the intervention independently. In addition to the training using the 3 words, an instructional video was used at the beginning of the first day of intervention of Set 1. Participants were asked to rate their level of understanding on a scale of 1 to 5 and additional training was provided if needed.

Baseline and Analysis Procedures

After receiving the instructional email, each participant joined the lead researcher in the Zoom meeting room, participants were greeted, and rapport was established. To establish a baseline, participants were presented with the word on an index card and had 3 seconds to sign it correctly as determined by the parameters of ASL. The number of correctly identified signs out of a total of 30 words was recorded. Each participant established a stable baseline of responses continued into the intervention. A stable baseline was defined as data points that remain flat using visual analysis. Baseline was collected over 3 sessions to establish the stable trend. Upon completion of each baseline session, participants logged into GoReact to complete intervention training. After a stable baseline trend was established, the Multimedia CCC intervention was implemented for each set. For all remaining sessions, all 30 index cards were used to assess recall of signs. Participants had 3 seconds to respond correctly as determined by the parameters of ASL. Participants could pass or respond that they did not know on any words they could not recall in ASL. Responses were recorded on data sheets. Probes were completed prior to each intervention.

Analysis

Visual Analysis

The analysis of experimental control was based on visual comparison of baseline and intervention phases. The baseline phase was established as a benchmark against which the introduction of the Multimedia CCC intervention was compared. Visual analysis was established by charting responses for each subject.

These data were evaluated and examined for change in level using data points to indicate the magnitude of the variable as compared to the baseline data points, a change in trend identifying the direction of the change in the data points, and any variability of the data points. In addition, percentage of overlapping data (PND) was calculated for each participant.

Social Validity

A questionnaire was given to the participants to assess student response to the multimedia CCC (See Appendix E). Participants were asked to rate and report on the usefulness of the intervention using a rating scale.

CHAPTER 4

RESULTS

In this chapter. results of the study are presented. First, levels of interobserver agreement on the dependent variable (i.e., English words signed correctly) are presented. Next, each participant's results for words signed correctly are presented and finally results from social validity questionnaires are also presented.

Is Cover, Copy and Compare an effective strategy for ASL acquisition for students with dyslexia?

Figures 4-8 illustrates the results for words signed correctly for each student.

Rey. Rey completed 13 sessions of CCC with the researcher. As illustrated in Figure 4, during baseline, Rey remained at 0 for all sessions for a mean of 0. During intervention for set 1, the words signed correctly ranged from 5 to 10 over 4 sessions with a mean of 7. For set 2, words signed correctly ranged between 2 and 10 over 3 sessions with a mean of 6.67. For set 3, words signed correctly ranged from 1 to 9 over 3 sessions with a mean of 6. Rey remained in a maintenance stage for 6 sessions for set 1 and 3 sessions for set 2. There were no maintenance sessions for set 3. During both sets, Rey responded correctly to all words. Nonoverlapping data was determined by calculating the number of intervention data points that exceeded the baseline data and dividing that number by the number of sessions in the intervention phase. PND for Rey for all 3 sets was 100%

Rey's results show an increase in level from baseline to intervention for all sets. For all sets, Rey's data shows variable across intervention sets. It can be noted that on

set 3 she demonstrated an immediate increase on the first session whereas in set 1 she required an extra session to see a consistent upward trend.

Lyndsey. Lyndsey completed 12 sessions of CCC with the researcher. As illustrated in Figure 5 during baseline, Lyndsey remained at 0 for all sessions for a mean of 0. During intervention for set 1, the words signed correctly ranged from 5 to 9 over 3 sessions for a mean of 6.3. Intervention for set 2 was carried out with 3 sessions with a range from 6 to 10 and a mean of 7.6. Intervention for set 3 was carried out with 3 sessions with a range from 5 to 10 and a mean of 8.3. Maintenance was carried out for sets 1 and 2. For set 1, maintenance was over 6 sessions with a range from 8 to 10 and a mean of 9.5. Maintenance for set 2 was over 3 sessions in which she responded correctly to all 10 words. There was no maintenance for set 3. PND for Lyndsey in all 3 sets was 100%

Lyndsey's results show an increase in level for all sets upon introduction of CCC. Her data show a gradual increase with a single dip in maintenance in set 1. She had a consistent increase after each session for sets 1 and 3. Set 2 she increased 2 out of the 3 sessions, with no change for the last data point.

Nick. Nick completed 12 sessions of CCC with the researcher. As illustrated in figure 6, during baseline, his words signed correct range was 0 for all sessions with a mean of 0. During intervention of set 1, his words signed correctly ranged from 4 to 9 over 4 sessions with a mean of 6.75. In intervention for set 2, his words signed correctly ranged from 4 to 9 over 3 sessions with a mean of 6. In intervention for set 3, his words signed correctly ranged from 2 to 5 over 3 sessions with a mean of 3.66. Maintenance was carried out for sets 1 and 2. Set 1 maintenance was over 5 sessions in which Nick

responded correctly to all words. For set 2, maintenance was over 3 sessions with a range of 9 and a mean of 9. PND for Nick in all 3 sets was 100%

Visual analysis of Nick's results shows a sharper incline for sets 1 and 3. Although there was an increase for set 3, the incline was less steep. Nick's results show a stronger increase over sets 1 and 2 with only a slight increase for set 3. His overall mean for set 3 was noticeably lower than other sets, 3.66 as compared to 6 and 6.75 for sets 1 and 2 respectively. His maintenance levels indicate successful use of CCC.

Serena. Serena completed 12 CCC sessions with the researcher. As illustrated in figure 6, during baseline, her words signed correctly range was 0 for all sessions for a mean of 0. During intervention for set 1, her words signed correctly range was 5 to 10 over 3 sessions with a mean of 8. For set 2, her words signed correctly range was 2 to 8 over 3 sessions for a mean of 5.6. For set 3, her words signed correctly range was 1 to 10 over 3 sessions for a mean of 5.3. Serena remained in maintenance stage for sets 1 and 2. Maintenance for set 1 was 6 sessions with a range of 9 to 10 for a mean of 9.8. Maintenance for set 2 was over 3 sessions with a range of 9 to 10 for a mean of 9.6. PND for Serena in all 3 sets was 100%

Serena's results show an increase in the level from baseline to intervention for all sets.

Table 3

Participant 1

Set	Sessions	*M*	*R*	*PND*
1	4	7	5-10	100%
2	3	6.67	2-10	100%
3	3	6	1-9	100%

Participant 2

Set	Sessions	*M*	*R*	*PND*
1	3	6.3	5-9	100%
2	3	7.6	6-10	100%
3	3	8.3	5-10	100%

Participant 3

Set	Sessions	*M*	*R*	*PND*
1	4	6.75	4-9	100%
2	3	6	4-9	100%
3	3	3.66	2-5	100%

Participant 4

Set	Sessions	*M*	*R*	*PND*
1	3	8	5-10	100%
2	3	5.6	2-8	100%
3	3	5.3	1-10	100%

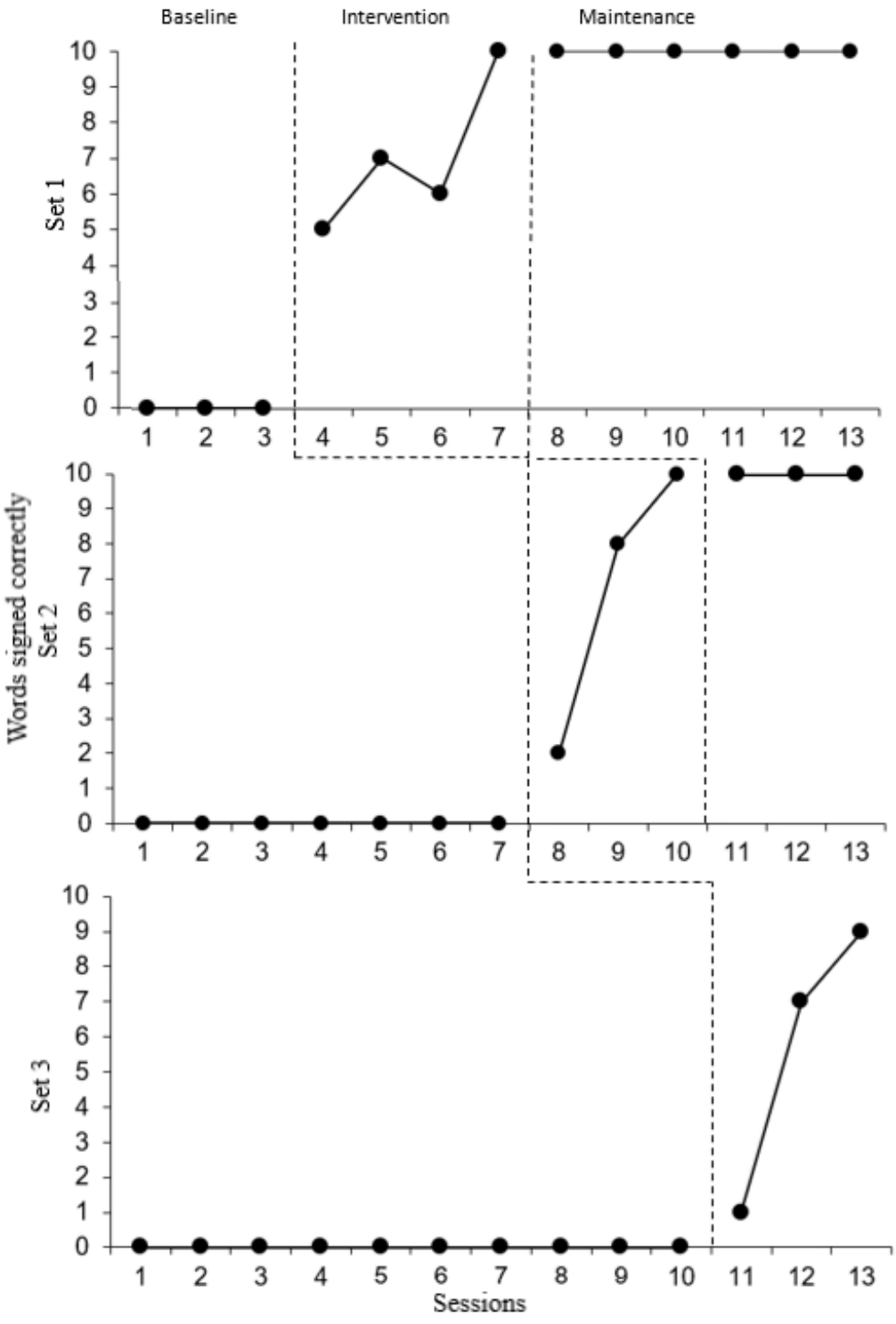


Figure 4

Rey's Words Signed Correct

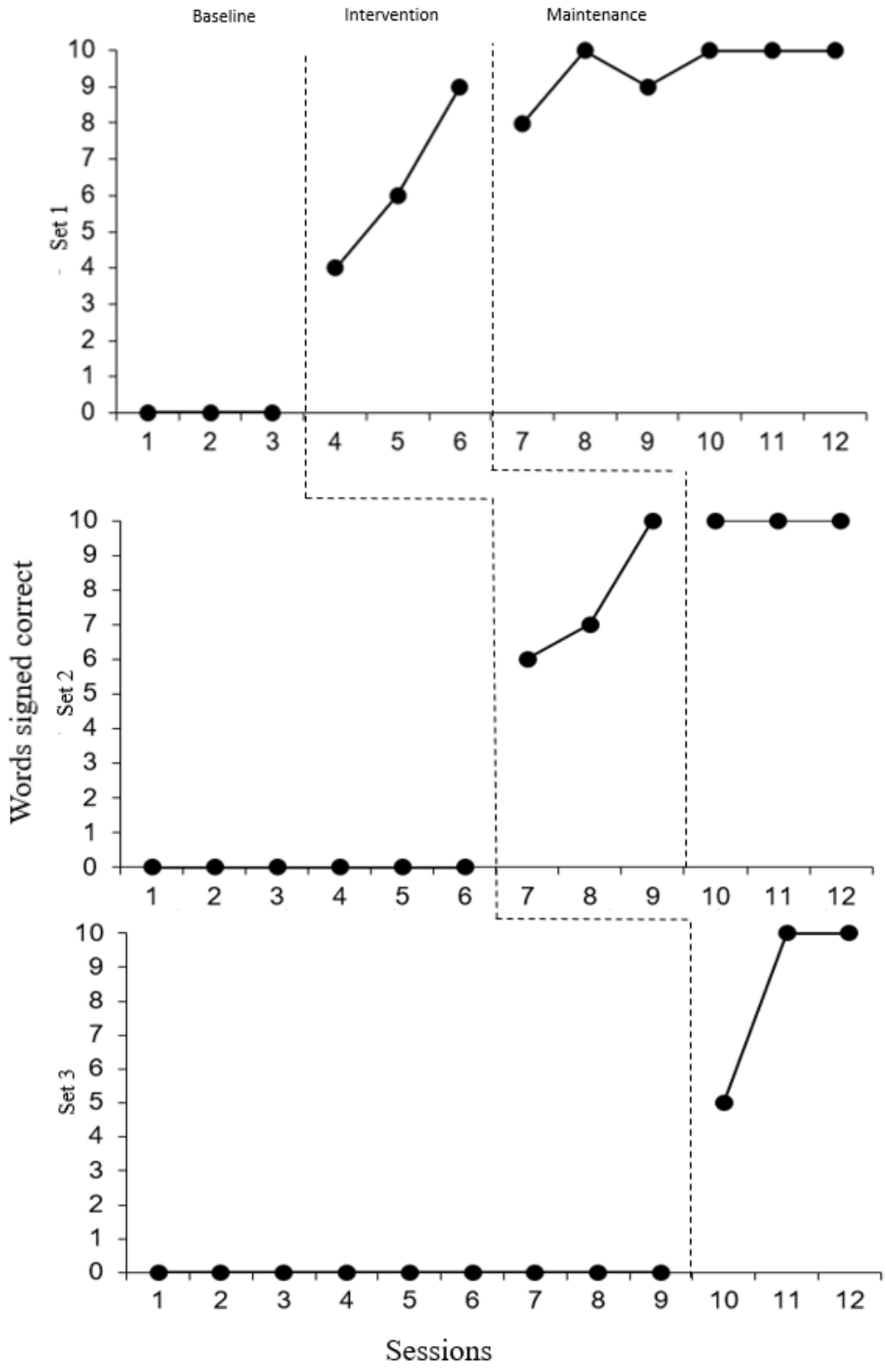


Figure 5

Lyndsey's Words Signed Correct

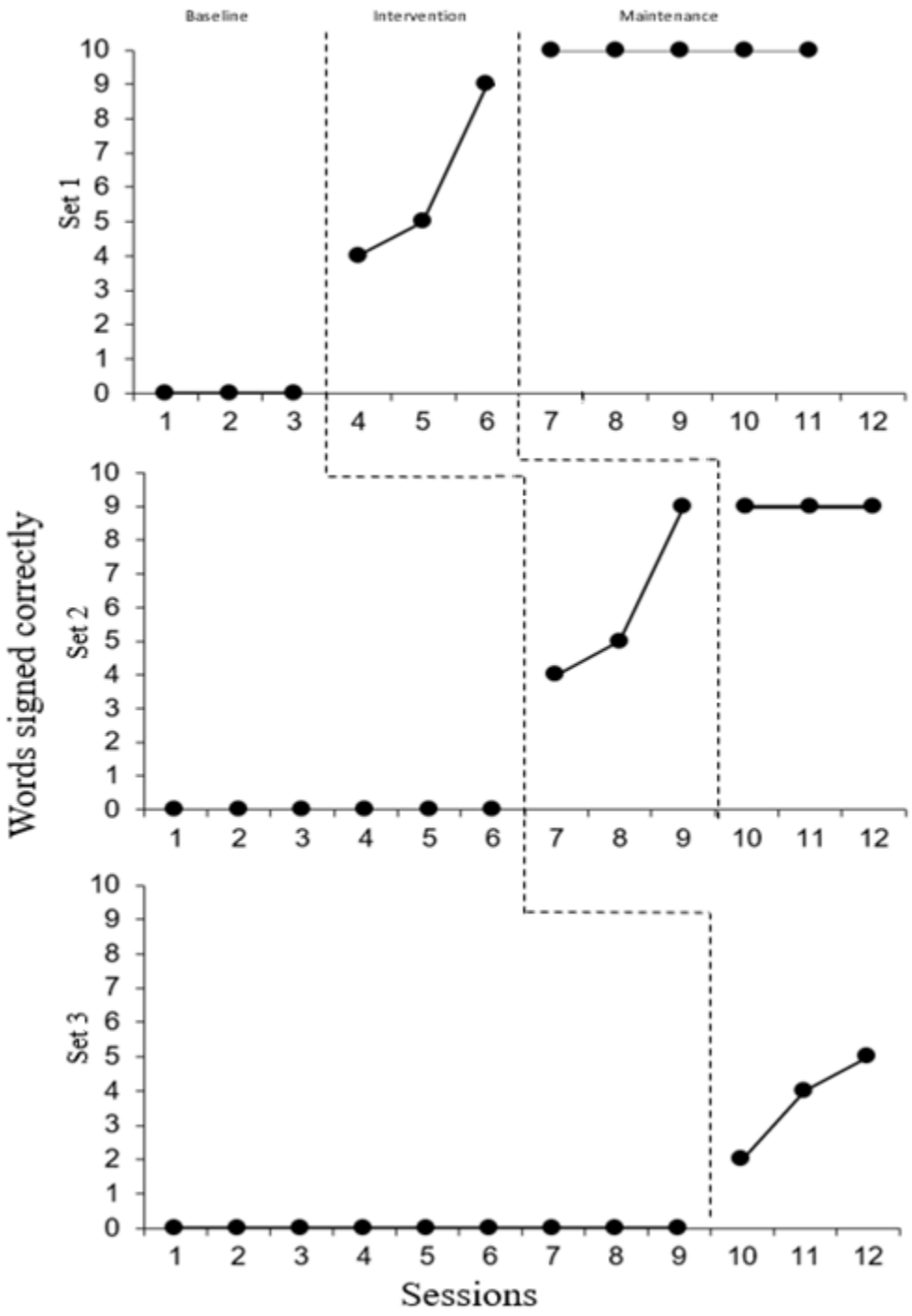


Figure 6

Nick's Words Signed Correct

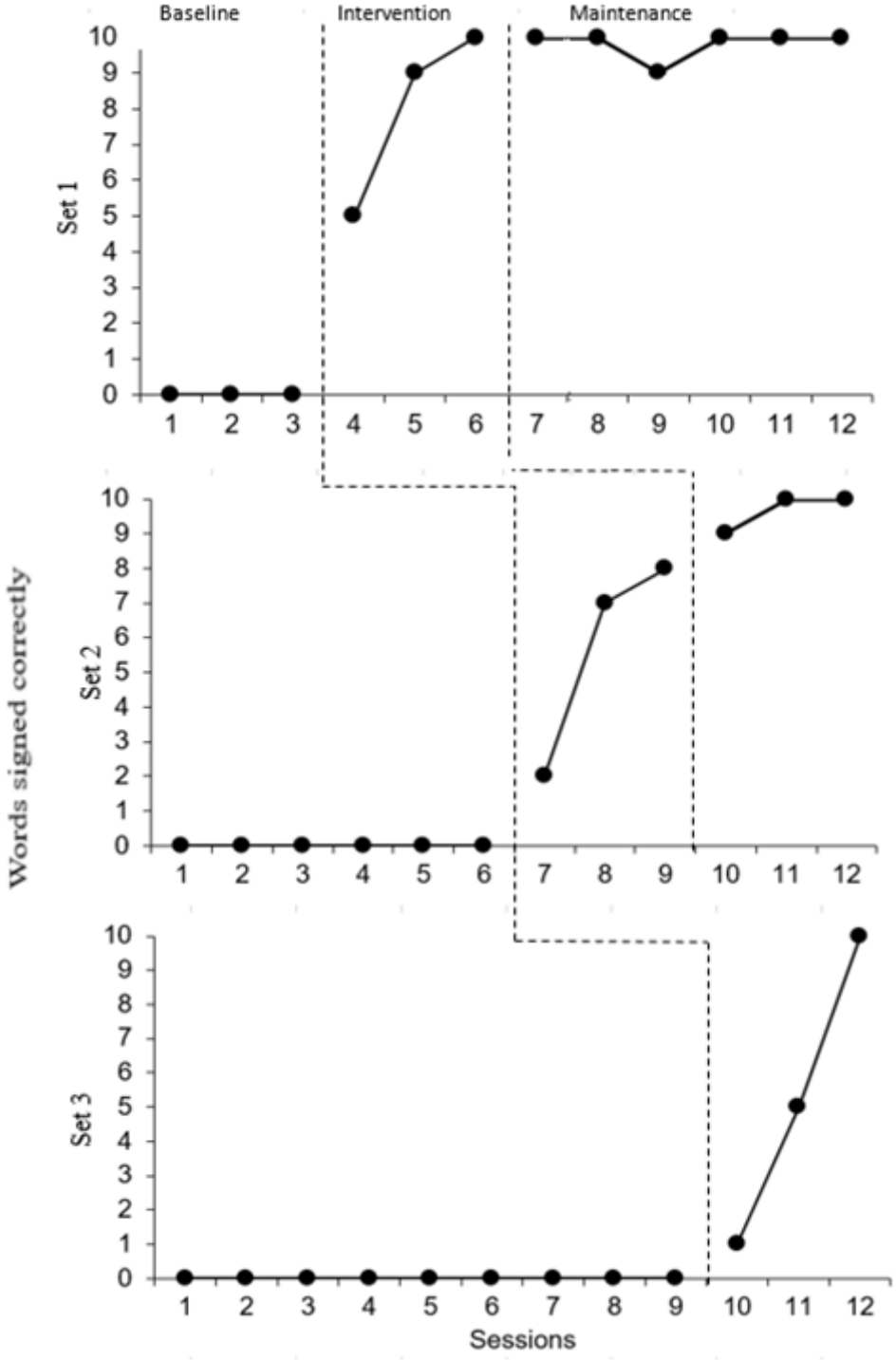


Figure 7

Serena's Words Signed Correct

Social Validity

Survey results indicate 3 of 4 participants strongly agree and 1 participant agrees that multimedia Cover, Copy Compare is an effective tool for learning new ASL vocabulary words. All 4 participants would strongly recommend multimedia CCC to students wanting to improve ASL recall. Three agreed multimedia CCC increased their recall and use of signs and 1 strongly agreed. All agreed they liked the procedures of the intervention and being able to work independently was a benefit of using CCC. They all agreed Multimedia CCC was a benefit for them, and others would like to use it.

Overall, each participant was eager to schedule each session and very pleasant to work with. They were excited to learn some sign language and learn how the intervention could benefit them in other ways. Some reported other types of strategies they had used as part of their education as it relates to dyslexia; however, none had used CCC before. Each reported they liked the method as used in this study.

CHAPTER 5

DISCUSSION

In this chapter, a discussion of the findings is presented. Discussion includes an analysis of the findings and limitations of the study. Suggestions for future research, and implications for teachers will be presented and discussed.

The results of this study indicate that the multimedia CCC intervention was effective in teaching participants how to sign words in ASL. There was an immediate increase in the total number of words signed correctly for each participant upon receiving the multimedia CCC intervention and, by using a multiple baseline design, a functional relation was established. For all participants, no more than 4 sessions were needed to establish an upward trend, with most participants needing only 3 sessions. Participants consistently increased the number of words signed correctly with each day of the intervention for the same set of words, with the exception of one case. During session 3 of the intervention, Rey signed 6 words correctly when she had previously signed 7 words correctly during session 2. She used an incorrect location parameter when signing WOMAN by placing her hand on her forehead which is MAN. Maintenance data collected for sets 1 and 2 indicate that most of the words taught were retained. In fact, participants signed more words correctly during maintenance than they did during intervention phase. These effects are consistent with previous findings on the intervention. (Cates et al., 2007, Hubbert et al., 2000, Nies & Belfiore, 2006). As a self-managed intervention, the procedures for CCC allow for additional exposure to learning separate from classroom instruction in a clear and efficient manner which remained true for multimedia CCC. The findings of this study contribute to what we understand about

the need to support instruction for students with dyslexia learning ASL as a second language.

Why was CCC effective in ASL acquisition for learners with dyslexia?

As identified in the standards for learning ASL, standard 1.1 is to communicate in ASL. “Students use American Sign Language to engage in conversations and provide information, express feelings and emotions, and exchange opinions.” (American Sign Language Teacher's Association [ASLTA], n.d.) At the interpersonal level this is seen in the learner’s ability to interact and negotiate meaning in the target language. At the presentational level, this is seen in the learner’s ability to present information to various audiences in the target language (*World-readiness Standards for Learning Languages*, n.d.). For learners with dyslexia, the ability to recall information is impeded. To develop automaticity, greater repetition, and opportunities to interact with vocabulary is needed. As ASL is a visual language, appropriate language models are not readily available for students to practice using correct production of signs. Using multimedia CCC allows the instructor to control the input of ASL while providing self-managed practice for the learners. Multimedia CCC required the learners to respond quickly, increasing the automaticity of recall. When learners can recall vocabulary at a faster rate, their ability to communicate with fluency can increase.

In addition to the increased recall of vocabulary, students experienced success which increases self-confidence. As detailed in Krashen’s hypothesis, a high affective filter can interfere with language acquisition. As students experience success with ASL, they will be more motivated to continue and to take risks. Participants all praised

multimedia CCC as an intervention for learning ASL and enjoyed the process. They reported they would recommend multimedia CCC as an intervention to others.

Maintenance data also demonstrate the use of multimedia CCC allows learners to retain the new vocabulary while continuing to add new vocabulary. Participants continued to recall vocabulary after intervention for the set discontinued. For communication to continue, vocabulary development must continue. The rapid multimedia CCC learning trials allowed the participants to engage in "over-learning which has been shown to increase maintenance" (Skinner, 1997). Participants had multiple opportunities for practice in a very short amount of time which increased their fluency and accurate responses which supports the greater number of correct responses during maintenance phases. Multimedia CCC proved to be effective in allowing students to continue to build a larger vocabulary while retaining previous vocabulary.

An observation from the researcher that indicates explicit instruction is needed in unique aspects of ASL occurred when signs sharing similar parameters were introduced. In set 1 the word *forget* was signed correctly by all 4 participants. In set 2 the work *black* is introduced. *Forget* and *black* are distinguished but 1 parameter, handshape. When signing *black* the handshape is a 1-hand moving across the forehead. When signing *forget,* the handshape is a closed-5 hand moving cross the forehead. (see Figure 5). It seemed this subtle difference may have contributed to errors in recall as participants may have confused the 2 signs.

Figure 8

Parameter difference

Note: The distinction between each sign is the handshape (ASL American Sign Language*, 2020*)

Another observation was made by the researcher during post intervention discussions with the participants. Participants reported making connections with the formation of the signs and the meanings. Signs are placed into 2 categories: arbitrary and iconic. Iconic signs are ones in which the form resembles the meaning where an arbitrary sign there is no apparent reason between the form and the meaning (Valli et al., 2011). Lyndsey made a connection of throwing dollars for the sign for *shop.* This aided her recall of the sign by associating shopping with money. Nick made a connection to driving with the sign for *travel.* He stated the motion reminded him of turning the steering wheel. Although the participants may not have chosen the actual meaning, they did make connections between the sign and a meaning. They expressed the iconicity of the signs certainly made it easier to recall each one. Participants shared their own connections to these signs on the final day of data collection. Participants did not have the same personal iconicity in signs. For example, the research could hear Nick quietly whisper “cook the bacon” each time he signed COOK to aid in recall. Serena did not report any specific such devices to aid in recall. As previously mentioned, Lyndsey associated throwing money away for SHOP. The sign that garnered question by all 4 participants was *Oh-I-see.* This is an arbitrary sign and somewhat of a slang sign. Although 3 of the 4 participants signed it correctly, they did not fully understand its meaning. This demonstrates how the intervention was successful in basic recall of signs but also indicates a limitation of comprehension and therefore, application. Successful production of a sign without comprehension of its full

meaning and practical use of the signs is limiting. When we look at second language acquisition and the first standard of ASL communication, the learner is able engage in conversation, obtaining information, expressing feelings and emotions, and exchanging opinions. If a learner only reproduces signs without understanding the meaning, there is not effective communication. The goal of higher-level language skills consisting of conversations and narrative comprehension requires learners to know the meaning and often multiple meanings of the signs. A deeper level of vocabulary use is needed for deeper levels of communication (Khoii & Sharififar, 2013). ASL linguistic features are complex as with any language. Simply sounding out a word with proper pronunciation in English does not indicate comprehension of the word's meaning, and simply signing a word with proper use of parameters does not indicate comprehension of the word's meaning.

As multimedia CCC is used as an intervention, it is important for classroom instruction to support the meaning of the signs for accurate use. This is best seen in the use of non-manual signals (NMS) in ASL. The researcher observed participants incorporating NMS during the production of signs in the trials. Native speakers of ASL will incorporate NMS and the stimuli depicted these expressions, mouth movements and other non-manual signals. Although these are often not included as part of the parameters used in evaluating correct production as they do not change meaning, NMS do add to the native like production of signs and can be equated to intonation in spoken languages. The dependent variable of sign production was not evaluated on NMS; however, participants did incorporate NMS in their sign production by mimicking the NMS of the native signer in the stimulus.

Multimedia CCC also allows learners to focus on other aspects of ASL communication like NMS Meaning is often relayed through facial expressions as well as other nuances of the sign's production (Reilly, 2010). If the learner is overly focused on sign recall, they are unable to develop the other features of sign expressions. McKee, et al (1992) noted students learning ASL as an L2 reported expressive use of grammatical ASL facial expressions and nonmanual signals (NMS) as one of the most problematic aspects of learning ASL (1992). These students were not identified with any L1 learning difficulties. The teachers in the same study mentioned how infrequently students would attend to NMS when watching sign language. By increasing their ability to recall vocabulary, learners of ASL can focus on other aspects of ASL expression not found in oral and orthographic languages. With ASL being offered more as a second language in secondary education, administrators may push for students with dyslexia or reading disabilities to enroll in ASL classes. It is important for instructors and administrators to be aware of the unique challenges and be able to address these for student success. This study does not address if ASL presents fewer learning challenges than other languages.

Students with dyslexia struggle with processing speed and recall. By providing additional and independent practice with the skills through multimedia CCC, students can have the repetition needed to improve recall of signs. Based on Krashen's (1985) theories of second language acquisition, multimedia CCC intervention is learning the signs while not acquiring the language. Therefore, second language theory would suggest multimedia CCC cannot be used in isolation. At the same time, with the slower processing speed and recall found in students with dyslexia, conscious learning and

explicit instruction is necessary to allow students with dyslexia the ability to develop successful use of ASL (*Effective Reading Instruction - International Dyslexia Association*, n.d.).

Krashen also believes meaningful interactions in the target language occur naturally with focus on the message and not the form. Per ACTFL, instruction should rely on natural language functions (*Guiding Principles for Language Learning* | *ACTFL*, n.d.). However, the needs of dyslexic learners are often hindrances to the natural communication needed for second language acquisition to occur as a subconscious process. Explicit instruction to increase recall and improve implicit learning improves the learning experience for learners with dyslexia.

Krashen also states an important condition for language to occur is for input language be a bit beyond the current level of competence (Krashen, 1985). ACTFL also supports instruction that is “a little beyond the student’s current level of competence (*Guiding Principles for Language Learning* | *ACTFL*, n.d.) In the classroom, not all students will be at the same level of competence. CCC as a self-managed intervention, allows students to progress at their own rate and allows the teacher to focus on individual needs of students. CCC may allow learners to have a high level of motivation and self-confidence with lower anxiety which Krashen also emphasizes in his Affective Filter hypothesis (Alfonso, V. C., Flanagan, D.P., Mascolo, J. T., 2014). Students who have high motivation, self-confidence and low levels of anxiety are better equipped for success in second language acquisition (Krashen, 1985).

Limitations

The maintenance results of this study were limited due to the time constraints of the study and the school calendar. Maintenance was carried out only for sets 1 and 2, following the multiple baseline design and occurred a week after the intervention to better measure the effectiveness of multimedia CCC on the maintenance of words signed correctly, additional maintenance probes should be given 3 weeks after intervention ceased and again at a later date. Although the current maintenance data indicates retention of new vocabulary, maintenance data that included a higher level of vocabulary would strengthen the evidence of multimedia CCC's effectiveness.

As previously mentioned, some signs were similar in sign production being distinguished by only 1 parameter. Having these words presented so close together made it difficult to maintain previously correctly signed words. Consideration to the order in which these are placed could improve effectiveness. Although words were chosen from the same units, grouping signs based on parameters could have an impact on the outcome.

An additional limitation was the lack of explanation of some signs' origins. With the previous example of *black* and *forget* additional instruction would explain the origin and iconicity of *forget*. The results of this study show effectiveness of recall of words signed correctly; however future research that combines the intervention with classroom instruction could show greater benefits with comprehension and recall. By pairing multimedia CCC with classroom instruction, participants are often given the origins of a sign and its iconicity which could aid in recall. This would allow for better comprehension and application of the signs.

Perhaps the greatest limitation is the narrow scope of only assessing signed words correctly. As with any language, ASL has its own grammatical features, inflections, idioms, and slang. All factors that are a part of effective communication. A learner that can only produce signs correctly lacks the nuances of ASL to carry on a conversation.

Review of the intervention recordings found participants often responded before the stimulus was complete. Timing of the stimulus could be reduced to allow for even quicker recall of vocabulary. For some participants all 10 word were mastered by the second try. Having more words in each set would allow for greater learning.

Future Research

Future research of multimedia CCC on words signed correctly should include students with dyslexia who are in classes to learn ASL either as a second language or as part of their major of study. These students could be either in the K12 setting or post-secondary. Researchers should pair multimedia CCC with classroom instruction to provide data indicating the benefit CCC provides in supporting the classroom instruction as learners with dyslexia benefit from the independent and repetitive practice of CCC. This study demonstrated the effectiveness of CCC on signing words correctly; however, use of these signs in conversation was not assessed. By pairing CCC with classroom instruction, additional research could determine the effects on language use.

Future researchers of multimedia CCC may want to use conversational stimulus videos to allow participants to improve recall of signs for dialogue. Stimulus videos could include sentences and phrases in ASL grammatical order. This could advance to

actual dialogue in which participants are responding to the stimulus in a conversational manner.

Non-manual signals (NMS) are also an area of sign production that could be emphasized in future research. As previously mentioned, NMS do not always affect the correctness of sign production, they do add to the dynamic aspect of language and provide intonation and deeper meaning. Native skills in ASL will incorporate NMS to add to the meaning of the sign. Expression is fundamental to effective communication in ASL and providing stimulus videos that emphasize NMS use would improve native-like skills.

In addition to using multimedia CCC with learners with dyslexia, this intervention has the potential to support ASL acquisition across a variety of learners. Future research focusing on different learners to provide data for other learning challenges to address aspects of facial expressions, grammatical structure, spatial awareness. Although this study focused solely on vocabulary development, future research could assess other aspects of ASL linguistic features with other learning challenges.

Conclusion

This study was designed to determine the effects of multimedia cover, copy, and compare strategy on the acquisition of signed vocabulary for participants with dyslexia. The results indicate that the multimedia CCC intervention was effective in increasing the number of words signed correctly. These results were consistent with previous studies (Cates et al., 2007, Hubbert et al., 2000, Nies & Belfiore, 2006) and provides evidence that the intervention positively effects recall of signed words. The use of multimedia CCC is recommended as an effective and socially valid intervention.

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Appendix A

Instructional Email template

Dear Participant,
Today is day [#] of our research.
Today at [time] you will:

Log into the zoom meeting [zoom link]
During the zoom meeting we will use the flash cards for all 30 vocabulary words.

Log in to GoReact [GoReact link]

Log-in information: User id:
Password:
Complete set [#] of the intervention.

If you have any questions or issues, please text or call me immediately at [### ### ####]

Appendix B

Data Sheet

Subject:_____ Evaluator: _____

Sessions									
1. **MAN**									
2. **PAINT**									
3. **PLAY-GAME**									
4. **WATCH-TV**									
5. **WORKOUT/ EXERCISE**									
6. **FORGET**									
7. **CHURCH**									
8. **SHOP (verb)**									
9. **WOMAN**									
10. **MONDAY**									
11. **BLACK**									
12. **TIRED**									
13. **SOME**									
14. **WATER**									
15. **TRAVEL**									
16. **ENGLISH**									
17. **DEAF**									
18. **COFFEE**									
19. **WATCH**									
20. **KNOW**									
21. **WHITE**									
22. **WHO**									
23. **OH-I-SEE**									
24. **SCHOOL**									
25. **SPANISH**									
26. **FINE**									
27. **WALK**									
28. **EASY**									
29. **CAMP**									
30. **COOK**									

Appendix C

Vocabulary List

	UNDERSTAND	YES
WHOWHAT	NOT UNDERSTAND	NOOH-I-SEE
WHEN	AGAIN	SCHOOL
WHERE	LEARN	HIGH SCHOOL
WHICH	STUDENT (LEARN+ER)	MIDDLE SCHOOL
WHY	TEACH	ELEMENTARY SCHOOL
HOW	TEACHER	COLLEGE
SAME	HEARING	SPANISH
DIFFERENT	OLD/AGE	ENGLISH
HELLO	START	FRENCH
MANWOMAN	WIN	GERMAN
PERSON	LOST	ASL
SHIRT	MOST	SIGN LANGUAGE
PANTS	SOME	ITALIANWALK
HAT	LITTLE-BIT	WALK-DOG
SOCKS	ALL	RUN
SHOES	STILL	DANCE
REMEMBER	SPEAK	WATCH (TV) (MOVIE)
FORGET	FINE	COOK
NICE-TO-MEET	#OK	KNIT
BLACK	SO-SO	SEW
BLUE	TIRED	CAMP
RED	SICK	TRAVEL
GREEN	MILK	PAINT
ORANGE	WATERATER	BICYCLE
BROWN	TEA	RIDE-BICYCLE
WHITEPURPLE	COFFEE	WORK-OUT
GREY	HOT CHOCOLATE	PHOTOGRAPHY
PINK	LIKE	PLAY “with” DOG
RIGHT	NOT-LIKE	SHOP verb
WRONG	FAVORITE	BOWLING
DRAW	PAY-ATTENTION	PLAY-GAME
WRITE	THINK	HARD
SUNDAYMONDAY	SORRY	EASY
TUESDAY	FORGET	NOT-LIKE
WEDNESDAY	MORE	GO-TO
THURSDAY	NOT-KNOW	COME-TO
FRIDAY	KNOW	MANY
SATURDAY		CHURCH

Appendix D

Vocabulary Sets

Set 1	Set 2	Set 3
1. MAN	1. BLACK	1. WHITE
2. PAINT	2. TIRED	2. WHO
3. PLAY-GAME	3. SOME	3. OH-I-SEE
4. WATCH-TV	4. WATER	4. SCHOOL
5. EXERCISE	5. TRAVEL	5. SPANISH
6. FORGET	6. ENGLISH	6. FINE
7. CHURCH	7. DEAF	7. WALK
8. SHOP (verb)	8. COFFEE	8. EASY
9. WOMAN	9. WATCH	9. CAMP
10. MONDAY	10. KNOW	10. COOK

Appendix E

Student Questionnaire

	Strongly Disagree	*Disagree*	*Slightly Disagree*	*Slightly Agree*	*Agree*	*Strongly Agree*
1. Multimedia CCC is effective tool for learning new ASL vocabulary words	1	2	3	4	5	6
2. I would suggest the use of Multimedia CCC to students wanting to ASL	1	2	3	4	5	6
3. Multimedia CCC increased my recall and use of signs.	1	2	3	4	5	6
4. I liked the procedures used in Multimedia CCC.	1	2	3	4	5	6
5. Being able to work independently was a benefit of using CCC	1	2	3	4	5	6
6. Overall, Multimedia CCC was beneficial to me.	1	2	3	4	5	6
7. Others would like to use Multimedia CCC	1	2	3	4	5	6
8. Overall, I would recommend Multimedia CCC to others.	1	2	3	4	5	6

VITA

Sara “Sally” Evans was born and raised in the foothills of the Appalachian Mountains of northwest Georgia. From an early age, she knew she would be an educator. While attending a local college, she was introduced to very special professors who opened the Deaf world. After completing a Bachelor of Science degree in Early Childhood Education from Berry College, she began a lengthy career in Deaf Education in both Georgia and Alabama. She decided to take on a new challenge of interpreting and earned her Master of Science in ASL Interpreting Education from Tennessee Temple University while interpreting in settings both educational and community. The teaching bug bit again and she began teaching at Lee University where ASL was available as a second language. Educating future interpreters who were both skilled and culturally competent to provide access to the Deaf community became a passion and led to pursuing her doctoral degree at the University of Tennessee where her research skills were honed and her love for teaching grew even more. Her background in K12 education contributed to the identification and interest in the diverse learning styles of college students as they take on second language acquisition of ASL. Upon graduation, Sally will continue to pursue post-secondary opportunities to teach and contribute to Deaf Education and Interpreter Education.