# Exploring the Benefits of a Separate Course in ASL Fingerspelling and Numbering to Develop Students' Receptive Competency

By

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## Abstract

**Exploring the Benefits of a Separate Course in ASL Fingerspelling and Numbering to Develop Students' Receptive Competency**

In Canada, the field of study related to teaching American Sign Language fingerspelling and numbering is very new. This study focused its examination on the potential educational benefits when incorporating fingerspelling and numbering within an ASL course as opposed to the potential educational benefits when creating a separate fingerspelling and numbering course for second language learners. The study was conducted by administering surveys, pre-tests, and post-tests with students from two Canadian Deaf Studies Programs, as well as interviewing instructors. The participants' receptive skill acquisition and complex rule comprehension of fingerspelling and numbering was examined in both instances (with and without a separate course) but no distinct differences were found. Data analysis of instructor responses indicated a strong inclination for advanced studies of fingerspelling and numbering for students who continue on to higher levels of education, specifically in American Sign Language-English Interpretation Programs. Additional research is needed, as this study was limited due to the small number of participants. In general, the results of the study confirm that fingerspelling and numbering are challenging practices for second language learners of ASL and that more curricular materials, focused on teaching these skills in natural conversational contexts, are needed.

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*I would like to dedicate this thesis to my mother,*
*Diane Zimmer, who always wanted to see me succeed.*

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# Chapter 1: Introduction

## Introduction

Learning another language is a beautiful and rich experience that allows individuals the freedom to communicate with others. There may be many reasons behind people's desire to learn another language. These reasons may include an individual moving to another part of the world where the language used is not their first language, and so they will need to learn a second language in order to fully participate in daily living. Perhaps an employer requires their employees to be bilingual in order to understand and communicate with customers. University students are also, at times, required to take foreign language courses to meet graduation requirements. Some people enjoy learning other languages so they can travel abroad and be able to communicate with people in their first language, learn their culture, ask directions, order meals or simply ask questions to gain knowledge of various topics.

Individuals who are interested in learning American Sign Language (ASL)[1] vary in many ways, as do their reasons for learning ASL. It is important to note that it is a far simpler task for a non-deaf person to learn some ASL than for a Deaf [2] person to learn to accommodate the non-deaf population's communication needs because signed languages are accessible to non-deaf people, but spoken languages are often not fully accessible to Deaf people. Often non-deaf parents of Deaf children or non-deaf individuals with Deaf family members who want to communicate fully with their children or family members seek classes to learn ASL. Some places of employment require their staff to learn ASL

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[1] See Chapter 2 literature review for more information regarding the history of ASL.
[2] Throughout this document, 'Deaf' is used to refer to a cultural and linguistic minority group, whereas deaf represents the audiological condition of hearing loss (Padden, 1989).

so they can communicate with Deaf co-workers or Deaf customers. Other individuals may be drawn to ASL simply by its modality. Being a visual language, it is often viewed by others as fascinating and intriguing thus evoking an interest to study ASL (Miller, 2008). In general, it seems the interest in learning ASL is on the rise. Research has shown that many students in their college or university years have taken some ASL courses due to interest or to receive a credit for their foreign language requirement. Quinto-Pozos (2011) noted a report from the Modern Language Association that stated that in the Fall 2009, most college and university students had taken ASL courses, making ASL the fourth most commonly studied language in the Untied States.

Students who take American Sign Language courses are either looking to improve their signing abilities in general in order to communicate with Deaf people, or to become interpreters. Most ASL students do not realize how extremely complex ASL is and how challenging it is to learn (Kemp, 1998). As well, they are unaware of the complexity related to the specific features of fingerspelling and numbering in ASL and the need to understand the rules for how to use them appropriately. When using fingerspelling, a particular handshape represents each letter of the alphabet (Tennant & Brown, 1998), and when using numbering, there are specific handshapes and movements used to represent each number.

Several studies mention that some college and university students have taken ASL courses as they assumed it to be a simple language to master only to later realize its complexity. Many non-deaf people incorrectly assume ASL to be a picture-like language (Quinto-Pozos, 2011; Kemp, 1998) and that its structure is representative of English words and word order. In reality, ASL has its own unique grammar and is a complete

language unlike any other language (Wilcox & Wilcox, 1998). Some researchers view the task of learning ASL to be more difficult than other spoken languages as it involves a different modality and takes many years to become proficient (Miller, 2008; Kemp 1998).

The students who have only taken ASL courses, without much interaction in the Deaf community, have shown that they experience difficulty reading fingerspelling and numbering and in understanding the rules related to both. According to Patrie & Johnson (2011), "Producing fingerspelled words is challenging as well, but production tends to pale in comparison with the difficulty of accurately recognizing fingerspelled words" (p. 4). For this reason, this study will examine the impact of teaching students directly about the rules of using fingerspelling and numbering, as well as practicing these structures as they learn ASL to see if their abilities improve. Specifically, the study will focus on whether providing second language learners of ASL with a separate course in fingerspelling and numbering would benefit their ability to accurately recognize these structures.

For those individuals who have recently graduated from an ASL-English Interpretation Program, a skill they must continue to strive to acquire is that of multitasking while working. Interpreters are required to manage language and interpretation tasks simultaneous. An example of multitasking for an interpreter is to take in the source language, understand the context and meaning of the message and then interpret it in the target language. Janzen (2005) states:

> There is too much to take care of during the activity if interpreting—managing information flow and context, the dual processing of incoming and outgoing texts, representing signers and speakers well, cultural and cross-cultural factors, situational concerns, etc. – to risk much linguistic inadequacy (p. 99).

In other words, an interpreter must recognize that continuous errors in their fingerspelling

and numbering will negatively affect their interpretation of the source message (Patrie & Johnson, 2011). Deaf people have often been and still are witness to interpreters that make many errors with fingerspelling and numbering, or interpreters that struggle to comprehend the production of fingerspelling or numbering of a Deaf person. Therefore, according to Patrie & Johnson (2011), "fingerspelling has become a central part of the fabric of ASL and a fluent signer must demonstrate proficiency in using it, in both producing and comprehending fingerspelled words" (p. 44).

There are very few recommended strategies for teaching fingerspelling and numbers in ASL. Thoryk's (2010) research identified some of these problems during her study. In regards to fingerspelling and numbering, she found that there was insufficient useful material available for both the instructors and the students and insufficient practice time in the classroom. Also, there were no recommended strategies for instructors on how to use the fingerspelling and numbering materials. Another concern was in regard to the quality of materials given to instructors and students for use during their studies. This became evident when some instructors began to use their own developed material for their course. The last problem identified was regarding the need for highly qualified instructors to teach ASL in the classroom (Thoryk, 2010). All these points support the argument that not enough research and materials are available to identify what is truly needed to properly educate non-deaf students in regard to fingerspelling and numbering. ASL instructors are still unsure whether the key to education is frequent naturalistic exposure to fingerspelling and numbering or frequent exposure through ASL classes.

**Importance of the Study**

Deaf Studies Programs (DSP), such as the one offered at Red River College (RRC), provide students with the opportunity to learn about American Sign Language, Deaf culture, and Deaf history so they can effectively interact with Deaf individuals. If the students want to become an American Sign Language and English interpreters, they need to continue their studies in the American Sign Language and English Interpretation Program (AEIP) at RRC.

I, the researcher of this study, and an instructor with many years of experience, have observed, along with my colleagues from the DSP and AEIP at RRC, students struggling with both receptive and expressive practices in fingerspelling and numbers during their ASL courses. We feel this struggle for the non-Deaf second language learners is due to the more challenging aspects of ASL, specifically the rate of speed and the complex rules of conventional usage. As Quinto-Pozos (2011) states, "the majority of adult learners of ASL struggle with fingerspelling comprehension or production" (p. 148).

I believe, as do my colleagues, that it is essential for any Deaf Studies or ASL-English Interpretation program to have a separate fingerspelling and numbering curriculum in addition to the general ASL curriculum. There are two different language practices involved: receptive and expressive. Receptive means being able to see, recognize and understand signs while expressive refers to signed language production. Most ASL curricula include a basic understanding of fingerspelling and numbering rules, but they do not offer the same in-depth rules as would a specific fingerspelling and

numbering curriculum. Fingerspelling and numbering play a major role in American Sign Language, therefore, it is important for students to develop practices in these areas.

It should be noted that fingerspelling and numbering are not separate from ASL, but are an integral part of the language. It is necessary to identify specific and separate areas of practice in order to develop fingerspelling and numbering skills so that students can acquire and understand the many complex rules. Patrie & Johnson (2011) state that they "believe that when individuals are given enough time and appropriate exposure to fingerspelled words, there is much greater likelihood that fluent and accurate expressive fingerspelling will follow naturally and contain fewer errors" (p. 4). This statement clearly supports the RRC instructors' theory regarding students' need for more time to practice fingerspelling and numbering skills. In Thoryk's (2010), study however, she suggests that students' comprehension of fingerspelling did not significantly improve when they took a fingerspelling only course, but that their abilities depended on the frequency of exposure to fingerspelling and actual time spent practicing fingerspelling. Thoryk's (2010) study is unclear as to whether or not an improvement in the students' skills was noticed after taking both an ASL course and a fingerspelling course at the same time.

In addition to the existing research, it is this researcher's opinion that it is important to offer our students fingerspelling and numbering courses that can be taught in company with the ASL courses. The practice of fingerspelling and numbering in ASL has many complex rules that tend to confuse students. Students learning ASL need to not only understand these rules but how to apply them appropriately. Additionally, Wilson (1992) examined students who expressed that recognizing fingerspelled words was the

toughest part of learning ASL. Additionally, others have noted that students should learn the history of fingerspelling and how it has influenced ASL. According to Padden & Gunsauls (2003), "Fingerspelling is interesting not simply as a language system but also as a human innovation that grew out of a long history of adaptions of the alphabet" (p. 31). Our students need a great deal of practice with fingerspelling and numbering skills as well as ASL skills in order to become interpreters. In support of this, Wilson (2011) recommends that fingerspelling and numbering curricula must be developed for interpreter training programs in order to support instructors who are educating future interpreters. As well, the curriculum should incorporate various skill levels in order to continue practice in fingerspelling. Fingerspelling courses should be offered alongside of ASL classes (Wilson, 2011).

In the fall of 2010, the Deaf Studies Program (DSP) at Red River College began to offer a separate fingerspelling and numbering course to their students. The students in the first year of DSP take this fingerspelling and numbering course, which runs 3 hours a week for 13 weeks in the first semester of the program.

**Statement of the Problem**

The purpose of this study will be to examine if the fingerspelling and numbering courses in Deaf Studies Programs are beneficial for students in their skill acquisition and complex rule comprehension of fingerspelling and numbering, separate from the general American Sign Language course. This study will also attempt to identify if this specific course is beneficial in aiding students' to gain knowledge of the rules related to fingerspelling and numbering. Also, it will examine the degree to which the students'

receptive skills improve in regards to fingerspelling and numbering as a result of this specific fingerspelling and numbering course.

Upon reviewing the results, this study will also consider whether or not it is essential to add another fingerspelling and numbering course to the American Sign Language and English Interpretation Program or to remove the fingerspelling and numbering course in the Deaf Studies Program at RRC. The program at RRC is currently under review and changes to the curriculum are expected in 2017. This study comes at an ideal time, as it will aid the department with program changes specifically regarding the addition or removal of the fingerspelling and numbering course.

Since 2010, this researcher has been collecting and reviewing feedback from students in their 2nd and 3rd year of AEIP, who were also previous DSP students. It seems they often state how they would prefer to have another fingerspelling and numbering course offered during AEIP. They have expressed their struggles with remembering all the complex rules of fingerspelling and numbering and the need for more practice of these skills. Since students are seen as novices, entering a new world and language with little or no knowledge, it is important for the students to know when Deaf people use fingerspelling and understand the rules of how to use fingerspelling and numbers. When communicating in the Deaf community, non-deaf students with weak fingerspelling skills may experience misunderstandings or frustration when struggling to comprehend fingerspelled words or numbers, or they may construct fingerspelled words or numbers inappropriately (Patrie & Johnson, 2011). The education of appropriate use and understanding of fingerspelling and numbering cannot be avoided as they are integral parts of ASL grammar. Patrie & Johnson (2011) stated:

> Fingerspelled word recognition can be the most difficult aspect of ASL comprehension, yet it is critical to the accurate understanding of ASL and is of particular importance to second-language learners who aspire to easily interact with signers in conversation and in professional contexts (p. 4).

The goal for this study will be to focus on students in Deaf Studies Programs who complete a fingerspelling and numbering course as part of their program, and compare them to students at other Deaf Studies Programs, where a separate course in fingerspelling and numbering is not offered. This study will help the researcher to identify whether or not the additional course will assist students to gain stronger receptive skills when receiving numbered or fingerspelled information from a Deaf individual. The researcher will seek to evaluate not only the students' ability to receive the information but also the comprehension of the overall message. The students' knowledge of fingerspelling and numbering rules will be also assessed. I will also ask instructors about their general teaching strategies, what kind of materials they use, and their experiences related to teaching fingerspelling and numbering.

The instructors at RRC and I, the researcher feel that the students' ability to comprehend fingerspelling and numbering produced by Deaf individuals has improved when compared to other students who have not been offered additional fingerspelling and numbering courses. The researcher would like to evaluate students at the two programs mentioned to see if our observations are indeed valid. Without support for our theory, we will continue to struggle with the decision of whether or not to keep the additional fingerspelling and numbering course, and if it is a worthwhile requirement for our students.

**Research Questions**

This study seeks to determine if a separate course in ASL fingerspelling and numbering is an effective way to develop students' receptive competency in this area. Specifically, the research question is as follows:

> Do second language ASL learners who take a separate course in fingerspelling and numbering develop better receptive competency in these areas than second language learners who are taught fingerspelling and numbering within a general ASL course?

Additional questions will also be addressed in this study:

a) How much knowledge do the students have at the beginning of the semester in relation to the fingerspelling and numbering rules and will this knowledge be increased by the end of the semester?

b) What level of receptive skills do students have at the beginning of the semester and will their skills improve by the end of the semester?

c) What impact did the additional fingerspelling and numbering course have on the target group?

d) What differences were identified when comparing the target group to the control group?

# Chapter 2: Review of Literature

## Introduction

The purpose of this study will be to determine whether or not a fingerspelling and numbering course offered independent of ASL courses will enhance the receptive practices of students enrolled in a Deaf Studies Program. This study will explore the affects of an additional course through the comparison of students in two Deaf Studies Programs.

In this chapter, the researcher will be providing background information to support this study. This background information will include a brief history of ASL, history of fingerspelling, a brief discussion on the research related to fingerspelling and a definition of fingerspelling. Additionally, the incorrect assumptions many non-deaf college and university students have regarding ASL courses will be discussed. Proficiency, and the length of time it takes to achieve proficiency in ASL will be discussed. As well, the acquisition of new practices for non-deaf individuals when learning ASL will be examined. The similarities and differences of how Deaf children acquire ASL as opposed to second language learners will be outlined. In the final section, the general use of fingerspelling and numbering in ASL will be described, including an explanation of the various patterns and rules.

## History of ASL

The Reverend Thomas Gallaudet, a well-known and esteemed educator of Deaf children, aspired to become many things in his youth but altered his path when he happened upon his young neighbor Alice, a Deaf nine-year-old girl. Alice was the daughter of the Cogswell family who lived next door to Gallaudet in Connecticut. After

spending some time with Alice attempting to teach her the names of different objects and what they were, Gallaudet became intrigued with the question as to how to educate a Deaf child. Wanting to research which educational system would be best for Deaf students, he traveled to Europe in 1815 in hopes of answers. He first traveled to Great Britain to learn an oral method of teaching, which did not incorporate any signs in its lessons. The ultimate goal for this method was to have students learn to communicate through speech. While there, Gallaudet asked the director to reveal his method of teaching but he refused. Next, Gallaudet traveled to Paris where he happened to meet Abbé Sicard, the director of the Royal Institution for the Deaf. Gallaudet observed the educational methods used in the school that taught Deaf students through the use of sign language. Abbé Sicard was willing to share their methods of instruction for Deaf students. While in Paris, Gallaudet became homesick and convinced Laurent Clerc, a pupil of Sicard's, to return with him to America to help establish the first Deaf school in the United States in Hartford, Connecticut. Gallaudet felt that the French method of manual signing was the best one for Deaf students to use in school. Deaf people in America started to learn and use a version of French Sign Language in 1817 (Maher, 1996; Baker-Shenk & Cokely, 1980). It is believed that some Deaf people had already developed signs in America for the purpose of communication before Clerc brought French Sign Language to America. It is likely that French Sign Language and "Old American Sign Language" were combined through time to become modern ASL. Currently, most Americans and Canadians use ASL (Baker-Shenk & Cokely, 1980; Lane, 1984).

Additional historical research by Groce (1985) has uncovered evidence that in the 17th century the residents of Martha's Vineyard had been using their own form of signed language that was readily used for daily communication between Deaf and non-deaf residents of this island. This common signed language allowed for a barrier free society for all regardless of their ability or inability to hear. One documented instance of the use of gestural communication in this area, known as *Martha's Vineyard Sign Language*, was with that of Jonathan Lambert. Jonathan was born in 1657 in Barnstable on Cape Cod and moved to Martha's Vineyard in 1694. He is believed to be the first Deaf individual to come to the island. Jonathan, a fisherman by trade, would communicate with other non-deaf fisherman and boats in the distance by using this island's sign language (Groce, 1985). As indicated in the research by Cerney (2004), the Deaf population from Martha's Vineyard was sent to Hartford for their education. It is thought that the language these pupils brought was amalgamated with the signed language brought by Clerc in addition to the sign language used by the other Deaf pupils from surrounding areas to become the language we today call American Sign Language (Cerney, 2004). In his research, Cerney (2004) mentions:

> ASL has a direct, though partial, connection with French Sign Language; it is therefore considered a part of the European Signed Language Family. ASL shares more vocabulary with French Sign Language than with British Sign Language. Yet similarities within the European Signed Language allow a certain amount of understanding (and a certain amount of confusion) between users of different European signed language (p. 25).

In 1955, William Stokoe, although he was a non-deaf individual, was asked to teach English at Gallaudet College to Deaf pupils. While employed there, Stokoe observed the Deaf students' signing styles and realized that the signed language used in and out of the classroom were different. In the classroom Stokoe's signing followed

English order, but outside the classroom Deaf students were using another kind of signed language (later known as ASL) amongst their peers. Stokoe realized that his students could not achieve successes in written English or reading unless he learned to teach in ASL. Unfortunately Stokoe was never able to master the language of ASL. This realization made him observe his students closely and led him to declare in 1960 that ASL was a complete language. Stokoe believed ASL met all linguistic requirements, so he focused his time and energy on convincing Deaf people and other people that ASL was a language. The response of many faculty and students to his work was that he must be crazy; however, he was stubborn and continued his research. Stokoe began encouraging Deaf and non-deaf people to develop and research signed linguistics as well. It is ironic to describe Stokoe as a "Father of ASL" because although he tried, he never became fluent in ASL. At the end of April 1960, his book *Sign Language Structure: An Outline of the Visual Communication Systems of the American Deaf (Stokoe)* was published (Maher, 1996; Liddell, 2003).

By the early 1970's, several linguists and psychologists began research on ASL. Their papers began to be published as a justification for the teaching of ASL explained that ASL was a language even though many people still did not view ASL as a bona fide language (Liddell, 2003; Padden, 1989; & Valli & Lucas, 1995). By the early 1980's, ASL began to be recognized as a language and began to bloom. Currently evidence exists to show that ASL and English have completely different grammars, and there is also evidence to prove the same for any signed language in relation to its county's spoken language (Liddell, 2003; Lane, 1984).

**History of Fingerspelling**

It has been historically documented that many centuries ago, monks who had taken a vow of silence for religious reasons had created a type of fingerspelling. Their fingerspelling represented the alphabet and was used for the purpose of silent communication (Padden & Gunsauls, 2003). In Spain in the 1600's, Pedro Ponco de León, a Spanish Benedictine monk, who was employed by wealthy families to educate their deaf children, took it upon himself to use the manual alphabet[3] created by the monks to educate deaf children. Pedro Ponco de León taught his students a manual alphabet with the hope that it would help his "deaf mute" pupils to speak. Pedro Ponco de León was later requested by Bernardino Hernandez de Velasco to educate the constable of Castile's youngest deaf brother, Luis. Juan Pablo Bonet, a soldier in the king's secret service and a member of the army under Bernardino Hernandez de Velasco, witnessed the teaching style of Pedro Ponco de León and became interested in Pedro Ponco de León's work. He eventually took León's manuscript of the manual alphabet and in 1620, Bonet published the first book of deaf education, which included the manual alphabet that was originally found in the prayer books the monks had written thirty years earlier (Bonet, 1890; Padden & Gunsauls, 2003).

The system of the manual alphabet found in Bonet's book (see Figure 1) soon spread to French Sign Language, ASL and many other signed languages (Lane, 1984; Mendoza, 2006; Padden & Gunsauls, 2003). During the 1700's, Abbé de l'Epée taught deaf children using both signed language and the manual alphabet found in Bonet's book in the classroom. Clerc, a student of Abbé de l'Epée, moved to the United Stated in 1817

[3] Manual alphabet is also known as fingerspelling

to help establish a school for the Deaf. This is how the manual alphabet and French Sign Language came to be introduced to the United States (Padden & Gunsauls, 2003).

One might assume that the manual alphabet that made its way to the United States was the same one to spread over the world, however, we know this is not true. Around the world there are several different kinds of manual alphabets used by Deaf people. For example, the manual alphabet used in Britain, New Zealand, Australia, and by Deaf Blind individuals uses a two-handed manual alphabet (see Figure 2). The United States of America, Canada and most of Europe use another manual alphabet (See Figure 3), which requires the use of only one hand. Similar to any language, signed languages evolve over time, and the signed languages of old (see Figure 1) have changed through time to become the manual alphabet we use today (see Figure 3). Some manual alphabet symbols are iconic such as the letters "C" and "Z", which resemble letter shapes, while other letters symbols of the manual alphabet are arbitrary (Padden, 2003).
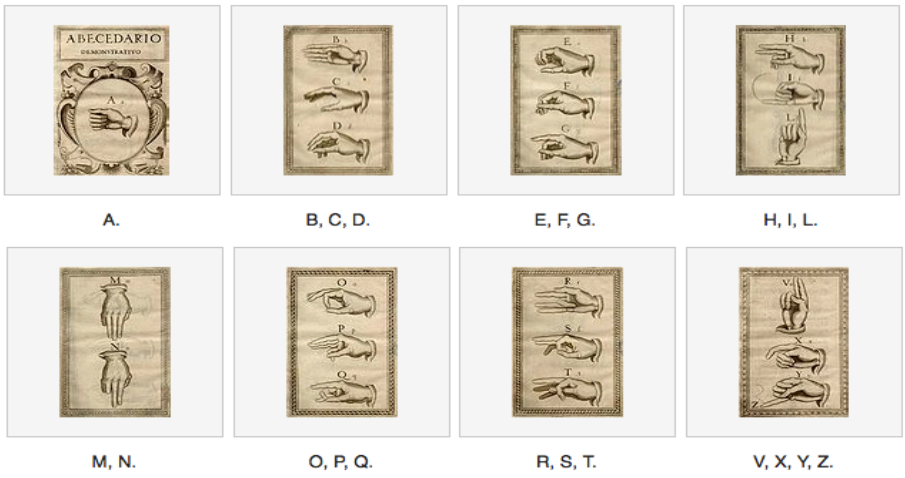



*Figure 1. Engravings by Diego de Astor of Reducción de las letras y arte para enseñar a hablar a los mudos (Bonet, 1620) retrieved from*

http://en.wikipedia.org/wiki/Fingerspelling

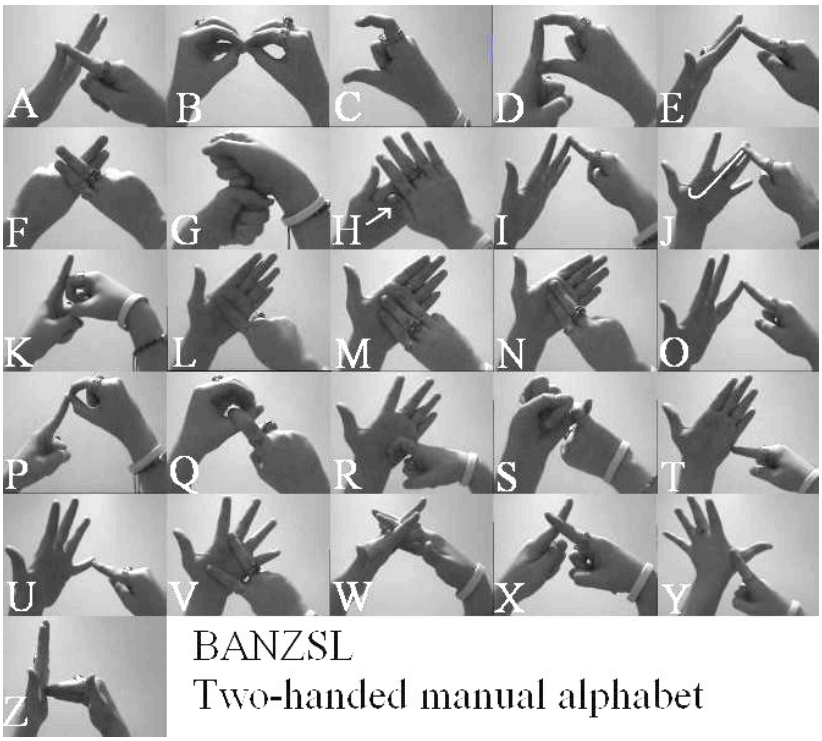



*Figure 2. Banzsl two-handed manual alphabet*

*Two-handed manual alphabet retrieved from*

*https://commons.wikimedia.org/wiki/File:Bimanual_alphabet.jpg*

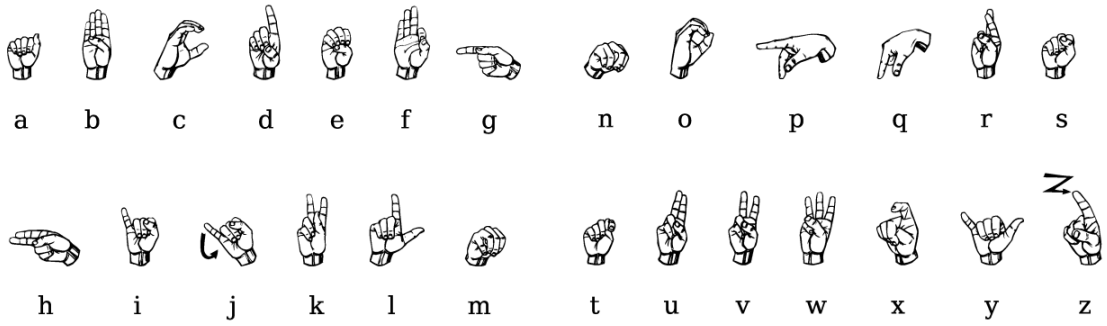



*Figure 3. American Manual Alphabet*

*Manual alphabet retrieved from*

*https://commons.wikimedia.org/wiki/File:Asl_alphabet_gallaudet.png*

Upon reviewing other historical documents, specifically from the Rochester School of the Deaf in1886, it was apparent that the educational approach was not through pure ASL but rather through the use of English through only fingerspelled words, spoken words, or written words. This approach, known as the Rochester Method, was accepted by Superintendent Westervelt and was believed to assist the students to quickly become proficient in written English (Rosenberg-Naparsteck, 2002). As a result of this teaching method, Deaf youth grew to become Deaf adults who heavily depended on fingerspelling in their daily communications.

**Research on Fingerspelling**

The study of fingerspelling and numbering in ASL is a relatively new field in the world of academia. Presently, very few studies have been conducted on numbering; however, some studies can be found regarding fingerspelling for adult learners and even more research on fingerspelling for native signed language users (specifically Deaf children of Deaf parents). The research on Deaf children's acquisition of ASL in comparison to second language learners, will be discussed later in this chapter under the acquisition of fingerspelling section.

It should be noted that there has been an increase in recent years in research regarding both the linguistics of ASL as well as the instruction of ASL. When reviewing the research on the instruction of ASL, it is apparent that a lack of information regarding how to incorporate new findings into fingerspelling and numbering curriculum can be seen, thus leaving the need for still more research to be conducted in this field. As well, when teaching fingerspelling, a great deal of drills and activities are used for both fingerspelling production and comprehension for the learner, but research has not yet

determined if the heavy use of drills and activities on both fingerspelling production and comprehension leads to success for the learner. This concern was noted by Quinto-Pozos (2011): "with respect to one such fingerspelling curriculum, which has been investigated by some of the limited research on the ASL pedagogical materials" (p.149).

In the field of ASL research, we can see an increased interest in the study of fingerspelling but more study is needed in the area of numbering. It is important to note that although some research has been conducted regarding Deaf children or Deaf adults and their use of language, very little Canadian based research can be found with respect to ASL [4] and no research related to Canadian fingerspelling or numbering.

**Definition of Fingerspelling**

When using fingerspelling, a particular handshape represents each letter of the alphabet because sometimes signers need to represent an English word. Fingerspelling is required to represent proper names of many people, places, brand names and titles (Tennant & Brown, 1998). Valli & Lucas (1995) also explain:

> It is true that the handshapes of the signs may resemble the written symbol and it is true that fingerspelling in ASL is the direct result of language contact with English. For example, the handshape of the sign "C" may look like the written English symbol C, but the sign is a sign and not a letter (p.63).

Fingerspelling can be considered a sign because you, at times, fingerspell a word that is based on a stylistic movement from the beginning to end. Handshapes may change during the fingerspelling of a word, some fingerspelling repeats movement, and at times, letters are omitted thus not following the spelling of the English word it represents (Valli & Lucas, 1995). In spoken language this is similar to borrowing a word from French into

[4] There is Canadian research begin conducted at the University of Manitoba, both in the Department of Linguistics and the Faculty of Education (Enns, Zimmer, Boudreault, Rabu & Broszeit, 2013) as well as some work at the University of Alberta.

English, and pronouncing it like an English word rather than a French pronunciation.

A lexicalized sign, also known as a loan sign, is the combination of both English and ASL movement. These words have their own unique characteristics of fingerspelling regarding changes in handshape, palm orientation, location or movement through combining letters or by using both hands in their production. Some letters had been deleted to become sign-like (i.e. #DG = D-O-G, or #JB = JOB) (Cartwright & Bahleda, 2007; Tennant & Brown, 1998). In his research, the linguist Robbin Battison (1978), in his research, identified nine categories of loan sign, which along with the six characteristics mentioned above also include semantics, reduplication movement and morphological. Additionally, Battison (1978) mentions that, "Movement additions and orientation changes, while less regular, are again part of the general process of turning relatively static fingerspelled sequence into more sign-like gestures" (p. 218) and he further notes:

> Finally, observations and elicitations indicate that these borrowed forms are used in patterns typical of loans words. They are primarily used by ASL-English bilinguals or ASL monolinguals, but are not used in situations where an English-based variety of Signed Language is used (p. 219).

**ASL in Postsecondary Institutions**

The first individual to recognize the linguistic validity of ASL was William Stokoe. His realization triggered research into ASL, as well as, advancing its popularity among non-deaf individuals and thus creating the need to expand many ASL programs (Jacobowitz, 2005). Because the research into the complexity of ASL is relatively new, it seems not to be common knowledge that ASL is a challenging language to master. In her research, Miller (2008) has shown that enrollment in ASL courses in both universities

and colleges was rather high in past years because students often assumed the course would not be challenging, therefore, allowing them the opportunity to attain a good mark without a great deal of effort. Students often assumed ASL was representative of English grammar, but as shown through years of research and studies, this is simply not true (Miller, 2008). Also, often the students view ASL as an "easy A" prior to taking ASL courses (Jacobowitz, 2005). In addition, Kemp (1998) explained that the largest misconception of students is the assumption that signed language is an iconic language filled with signs like those for drink, sleep and eat. ASL, as proven in studies (Quinto-Pozos, 2011; Wilcox & Wilcox, 1998), is a complete and extremely complex language, which requires a lot of exposure and practice in order for a learner to become proficient.

In 1990, the Americans with Disabilities Act (ADA) was passed and in it was a passage that stated that post-secondary institutions would begin to accept ASL as a foreign language or an elective academic credit (Miller, 2008). At the same time, Kemp (1998) explained, enrollment in schools and agencies offering ASL courses was unprecedented as a result of an explosion of interest in learning ASL. This increase in enrollment created a high demand for qualified ASL instructors, which in turn impacted the need to provide training for ASL instructors (Jacobowitz, 2005). Similarly, non-deaf individuals who had taken an introductory evening course in ASL through a private business or community club and found it easy assumed that taking a Deaf Studies Program (DSP) or ASL-English Interpretation Program (AEIP) would also be easy too. Many students believed a DSP or AEIP would be an easy way to obtain a certificate or degree. When examining why night courses lead non-deaf individuals to this conclusion, it is apparent that teacher qualifications is a key factor (Miller, 2008). Evening

community ASL courses are typically taught by Deaf people who do not have any formal training in ASL pedagogy, and therefore, offer a more simplified class. Related to fingerspelling courses, Wilson (2011) collected data that showed "both deaf and hearing teachers were not adequately trained and did not fully understand the complexity of fingerspelling teaching" (p. 67). She recommended more formal training for instructors in the teaching of fingerspelling and continued education and workshops on fingerspelling (Wilson, 2011).

**Proficiently in ASL**

The ability to become proficient in any language is a challenge but as Jacobowitz (2005) found in her studies, if a student wants to become proficient in ASL it could take approximately nine years. Kemp (1998), who incorporated the findings from Jacobs's (1996) research, found that in order for a student to learn ASL fluently, it would take 10 hours per week of ASL classes at the beginner level, followed by a reduction to 5 hours per week of ASL classes when the learner moves to an intermediate level. In the advanced classes, it would take 3 hours per week of ASL classes for a total of eight years. As well, in order to achieve an intermediate level of communication the student requires continuous exposure to ASL. Therefore, the students will have to work hard and put in serious study time in the course. When considering students who want to become interpreters, their task of becoming fluent ASL users is not easy. The students enrolled in an AEIP are given only two to four years to become proficient in ASL while also learning the skills required to interpret from one language into another. These students can be compared to those enrolled in a spoken language interpretation program who typically enter their program already fluent in both the languages they will be interpreting. For

example, students whose first language is English may go to a French immersion school to learn French beginning at an elementary level. They likely become experts in both languages by studying both languages from childhood. On the other hand, students entering the DSP and AEIP generally begin to learn ASL as adults. A student becoming a French language interpreter enters a program already having mastered the French language, therefore, only needing to focus their studies on the skill of interpreting. According to Monikowski & Winston (2011), many spoken-language interpreting programs require students to be proficient in both languages before entering their programs. As this is not the case for students enrolled in an AEIP, their workload in the two to four year programs becomes very challenging. A non-deaf student enrolled in an ASL and English Interpretation Program must not only learn the skill of interpreting but must also focus a great deal of energy on learning and mastering ASL at the same time. According to Monikowski & Winston (2011), "the challenge remains of teaching students how to interpret when they do not have adequate language skills" (p. 375). The students in an AEIP or DSP need a great deal of time to focus on ASL in order to gain mastery in a relatively short period of time, which is impossible. Thus, these students must be able to maintain a high level of academic standards throughout the program in order to successfully complete the program.

**New Skill Development for Non-deaf Learner**

Non-deaf students are naturally skilled at using their voice with intonation and expression to have a conversation and to communicate their thoughts. However, this may not be the case when they are using their second language, and especially when that second language is also in a different modality, like signed language. While signing, a

student may mentally consider the number "seven" but physically produce the handshape form of the number "eight" instead. According to Klima and Bellugi (1979), "slips of the tongue", describe utterances made in error during spoken language production. This too can be seen in ASL when an individual incorrectly produces a sign other than the one intended. This was coined a "slip of the hands" (Klima & Bellugi, 1979). These kinds of challenges involve mental processes, as well as hand and eye coordination, and learning a completely new set of skills. This is appropriately described by Quinto-Pozos (2011) as "having to learn how to use their hands, arms and bodies in new ways and having to acquire a manual phonology as an adult" (p. 144). Kemp (1998) explains, "communicating in ASL requires the use of hands, which can be quite an adjustment for new learners" (p. 258). Not only is it apparent that the use of one's hands, body and eyes can be awkward for students but it also, at times, may bring out feelings of discomfort and even cultural conflicts. For example, in some Aboriginal cultures, eye contact between communicators is not considered appropriate, but for ASL and Deaf culture continuous eye contact is essential for communication. It is examples like these that illustrate the source of struggles experienced by students trying to understand Deaf culture and comprehend the rules of ASL in order to use it appropriately and effectively. In addition, Miller (2008) suggests that Deaf people's communication always relies on the use of their hands and eyes while non-deaf people often feel strange and uncomfortable using continuous eye contact and overuse of body gestures. This discomfort experienced by ASL learners is described simply as a form of culture shock, as defined by Oberg (1960):

> Culture shock is precipitated by anxiety that results from losing all our familiar signs and symbols of social intercourse. These signs or cues include the thousand and one

> ways in which we orient ourselves to the situations of daily life: when to shake hands and what to say when we meet people…Now these cues which may be words, gestures, facial expressions, customs, or norms are acquired by all of us in the course of growing up and are as much a part of our culture as the language we speak or beliefs we accept. All of us depend for our peace of mind and our efficiency on hundreds of these cues, most of which we do not carry on the level of conscious awareness (p. 142).

According to Wilcox & Wilcox (1998), when non-deaf people use their eyes and face, they feel uncomfortable maintaining eye contact for long periods of time, as it culturally inappropriate according to mainstream hearing peoples' cultures in North America. However, for Deaf people, it is important to maintain eye contact in order to communicate with each other. If one person does not maintain eye contact during a conversation, it is considered that the receiver is uninterested in maintaining the conversation or can be viewed as an insult: just as turning one's back is an insult. The value placed on maintaining eye contact in Deaf interactions is because ASL is a visual language. Wilcox & Wilcox (1998) also explain: "Culture values are shared; members must learn, accept, and share the values of the group before they can be said to be a part of that culture. The same is true for Deaf culture" (p. 55). Therefore, when non-deaf individuals learn ASL, they also must learn Deaf culture in order to allow for a deeper understanding of the language and community. An interesting discussion from McKee & McKee (1992) found that:

> Some attention has been directed toward difficulties that hearing learners face in acquiring and using a language in a visual-gestural modality, as opposed to the familiar aural/oral modality. The first major task that hearing learners face is learning to attend visually to linguistic information that is coded in a form for which they have no perceptual "schema." This can be physically and mentally demanding for ASL learners, even beyond the early stages (p. 131).

McKee and McKee (1992) collected data of comments from students learning ASL as well as the ASL instructors' comments when he/she taught ASL. Two interesting

comments from two students and one ASL instructor were noted and were as follows: "Facial expressions are difficult because in English we are embarrassed making certain faces. Also certain body movements are considered rule or crude in English but are perfectly natural in ASL" (p. 138). A second student remarked about facial expression that, "I understand them, but I'm not very successful in using them consistently. It seems that I really have to concentrate to have my thoughts, hands, and face to coincide effectively" (p. 139). And lastly, ASL instructor's perspective of non-deaf learner commented, "Facial expressions is one of the worst things. It seems to be related to students' own cultural background" (p. 139).

**Acquisition of Fingerspelling**

Research on adults' acquisition of a second language and fingerspelling is very limited and more research is needed. Students often share their experiences and opinions about fingerspelling and how it is an extremely difficult task to learn, both to produce and to comprehend fingerspelling (Wilcox, 1992). In particular, Wilcox (1992) recommends that more research regarding receptive fingerspelling is needed, and more studies that identify why non-deaf adult learners have difficulty with receiving fingerspelling are needed.

A study conducted by Carol Padden (2006) focused on how Deaf children of Deaf parents learn fingerspelling. It seems the children in her study were learning to fingerspell twice. In their preschool years, the Deaf children were able to recognize fingerspelling as a whole configuration, but when entering school they began to understand the connection between fingerspelling and the letters within the words. This process was similar for non-deaf children of Deaf parents. Interestingly, Wilcox (1992)

explained that Deaf children looked at fingerspelling not based on individual letters but looked at the movement of the fingerspelling as a whole like a sign in ASL. Wilcox (1992) suggests "a model of fingerspelling structure in which each fingerspelled word is a complex 'sign'" (p. 22).

This learning process appears to be the opposite for non-deaf learners of ASL. Non-deaf adults seem to focus on the letters within a word rather than the word itself (Padden, 2006). Their struggle worsens when they are faced with rapid fingerspelling where each letter is not represented clearly but rather in a blurred, connected motion to create a whole signed configuration. Non-deaf adults are typically "literate", in that they read and write English, so are tuned to associating the fingerspelled handshapes with written letters, which results in breaking down the words in this way instead of focusing on the "shape" and "movement" of the fingerspelled signs. Fingerspelling is an essential part of ASL and is seen when discussing names of people, names of places, brand names and so on. It is an unavoidable part of ASL, and therefore, must be taught to non-deaf students (Padden, 2006). According to Wilcox, "one reason why these problems are so serious is that fingerspelled words or phrases often contain critical information. Inability to comprehend one fingerspelled word or phrase can easily result in one missing the entire point of a conversation" (p. 29). This means that non-deaf adult learners, who tend to focus on individual letters, must learn to watch a fingerspelled word as a whole. Gallimore (1966) through her work "Expressive and Receptive Fingerspelling for Hearing Adults", describes an approach for students to read fingerspelled words through drills and she thought this technique would help students to see the sequence of fingerspelling instead of individual letters. This technique is still used to teach adults to

learn fingerspelling (Mowl, as cited in Wilcox, 1992).

While teaching fingerspelling and numbering to students, a technique often used by instructors is to tell students to look at the fingerspelled word as one configuration and movement of handshapes rather than focusing on each letter individually. By focusing on individual letters, the students struggle to identify the whole word being represented in ASL (Padden, 2006). Students sometimes mentally block out receptive fingerspelling due to their fear of not understanding the word. Due to this fear and the difficulty it causes in comprehending fingerspelled words, Mendoza (2006) suggests that students could improve their receptive skills by learning several strategies. The strategies are seeking clarification, using background information, and using meaningful context that will help the students to recognize the fingerspelled word. Background knowledge is an important part of a student's ability to comprehend fingerspelled words. For example, if the topic being discussed is related to baseball, the student will then be able to focus only on information regarding baseball and fingerspelled words related to the sport. Likewise Cartwright and Bahleda (2002) stated, "if the context is a subject with which students are familiar, chances are they will be able to successfully decode the fingerspelled content based on knowledge of the subject" (p. 34). According to Jamrozik's (2010) study, "the data clearly show that an ASL student's ability to comprehend a fingerspelled word increases if the fingerspelled word is viewed with context" (p. 37) and "in teaching second language learners of ASL to read fingerspelling, it is necessary to teach students to recognize contextual cues" (p. 38).

Jamrozik (2010) has developed the "Jamrozik 3 Step Plan" for students to improve their receptive skills by using contextual cues. These steps will help reduce the

anxiety for novice signers, and are also beneficial for all students who learn ASL at any level.

Jamrozik advises,

> teaching students to use contextual cues to aid in deciphering fingerspelled words. This technique teaches students to discern signs, use prediction skills, and trust their ability to use closure skills to understand a message. Students' fear begins to subside as they become more confident in seeing not only the fingerspelled word, but the cues around the word. This technique works well for introducing new vocabulary (non-fingered) words, as well as teaching students how to use context to figure out an unknown sign in context (p. 43).

**General Information Regarding Fingerspelling and Numbering**

In this study, the symbol # will indicate when a word is to be fingerspelled in a style similar to a sign—incorporating "shape" and "movement" (i.e. #YES). If the word has a dash between each letter, then the word is to be fingerspelled with each letter clearly represented following English words (i.e. W-O-R-D).

The use of fingerspelling and numbering is an essential part of ASL. It is interesting to note just how often these two aspects of ASL appear in signed dialogue. In the research conducted by Padden (2003), she states, "Fingerspelling constitutes anywhere from 12 to 35 percent[5] of signed discourse in ASL and is widely used by signers across gender, age, class and ethnicity" (p. 15). Padden (2003) also discovered that people who are well educated or professionals tend to fingerspell more than someone who is perhaps less educated. Her research also concluded that native signers of ASL use fingerspelling more frequently than non-native signers. Furthermore, ASL signers fingerspell at a faster speed compared to native signers of French and Italian sign languages (Padden, 2003). In a classroom environment, one can often find a teacher

[5] These percentages have not been confirmed for Canadian ASL signers.

using fingerspelling and numbering during a lesson. An example of this can be found in a science class where the teacher fingerspells the word P-R-O-B-L-E-M instead of using the ASL sign for the word "problem" (Padden, 2003). According to Padden (2003), in the classroom "fingerspelled words were often used to established a different kind of meaning: one more foreign or scientific and not intuitive" (p. 27). By fingerspelling the word P-R-O-B-L-E-M, the students can clearly identify that this is a scientific term used to assess and solve a scientific question by using scientific methods.

Many researchers have considered how fingerspelling corresponds to handshapes and the printed letters of English. In actuality, when fingerspelling, the letters are produced in a rapid and fluid succession that often times only the first and last letters of the word are clearly visible while the other letters in between are not. When fingerspelling a word, its appearance becomes smooth and flows because of the continuous motion of the consecutive handshapes changing into other handshapes continuously (Wilcox, 1992). Maxwell, in her study (1988), clearly recognized that non-deaf novice signers tend to spell out a word in the air by using separate and disconnected letters. It is impossible for Deaf people to communicate with letter-by-letter fingerspelling as Deaf people do not fingerspell words as a written word because fingerspelling is a three-dimensional movement.

The most recent research update from Bridges (2012), a Deaf ASL linguist, noted that fluent signers fingerspell by using primarily their thumb and the first two fingers without using their third and fourth fingers for most words with the exception of letters such as B, C, F, I, J, M, W, Y and Z. This style is not recommend for interpreters to use while working as this style of signing will not match all interpreting settings. If, for

example, a Deaf person is sitting in an audience watching an interpreter on stage, the fingerspelling will need to be clear and crisp so the Deaf people or signer will be able to see when seated at a distance. It is, however, essential for interpreters to understand how fluent signers fingerspell as it will help them to improve their receptive skills. Bridges (2012) also noted that Deaf people tend to fingerspell a word more often if it is 3 or 4 letters in length, as it is a small word. They would rather fingerspell the word instead of using a sign. Also, sometimes short words do not have a sign so they are required to fingerspell them. Battison (1979) explained that short words that are fingerspelled can involve a change of meaning by changing movements, location, orientations, or using two hands. For example when fingerspelling #ALL, several different meanings can be applied, such as "writing all (on paper)", "all those people", or "always".

**Rules in Fingerspelling and Numbering**

There are a few general tips regarding fingerspelling and numbering that individuals should learn and use in order to increase their receptive skills when receiving numbered or fingerspelled information. In this section the general tips that are discussed apply to both fingerspelling and numbering. Thus, for this section if "fingerspelling" is mentioned, it will apply to both fingerspelling as well as numbering.

1. Visual acuity. When a person is fingerspelling a word, the receiver of the information should look at their face and not focus on the hand alone. The person receiving the information should practice widening their perspective to include both the face and hand that is fingerspelling. This technique is called visual acuity. It also allows the receiver to watch the face to receive grammatical facial information that may help with decoding (Bridges, 2012).

2. Practice closure skills. For example, when a person misses the word being fingerspelled they can look to the context that the fingerspelled word is related to for clues unless they are unfamiliar with the context. If there is no context prior to the fingerspelled word, it will be harder to figure out what the word in question is. It is important to use prediction skills based on the context of the conversation. This skill will help you to think ahead for other potential fingerspelled words (Bridges, 2012; Cartwright & Bahleda, 2007).
3. Configuration. When you look at a fingerspelled word, you will see that the signer's handshape will change or move while fingerspelling. Receivers will need to learn to see the shapes of the whole word rather than individual letters (Bridges, 2012; Cartwright & Bahleda, 2007). As well, you will notice that handshapes will change if a letter is tall (i.e., b, c, d, f, k, l, r, u, v, and w), if a letter is signed downward (i.e., p and q), signed to the side (g and h) and a letter that requires movement (j, z and sometimes x) (Mendoza, 2006). Zinza (2006) offers the example that, when you read a book, you don't look at the each letter to form a word, you simply rely on the first and last letters to identify and understand the words, and this is the same process applied to fingerspelling. ASL students will need to learn to identify the shapes related to fingerspelling through practice.
4. Ask for clarification. When ASL learners miss a fingerspelled word, they can always ask for the word to be repeated for clarification (Keaton, 2005) as long as they do not ask the signer to slow down, as this will not help with communication flow. If the word is repeated slowly it becomes a process of decoding letter by letter, which will ultimately disrupt the student's receptive skills (Cartwright & Bahleda, 2007).

5. Change viewing angles. It is recommended that students practice reading fingerspelling from different points of view other than directly in front of the signer, which can happen in real life situations (Cartwright & Bahleda, 2007).
6. Indicating an error. If an error is made when fingerspelling, the signer can freeze their hand and use a headshake to indicate an error was made and then start fingerspelling again (Cartwright & Bahleda, 2007).
7. Movement. Do not bounce, jerk or move your hand while fingerspelling (Zinza, 2006).
8. Hand position. When fingerspelling, signers should make sure to keep their elbow down, close to their side, and hold their hand to the side of their chest, not in front of their face (Zinza, 2006). Some fingerspelled words are not restricted to this area. The location sometimes changes depending on the context and grammar. For example, if the person is always thinking of food, you will fingerspell #FOOD on the forehead area (Valli & Lucas, 1995).

People who want to learn fingerspelling should learn the following basic fingerspelling rules as the rules include several patterns specific to fingerspelling as well as specific movements when fingerspelling.

1. The pausing rule indicates that you are required to pause. Add a little head nod between each word when you fingerspell two words or more (Bridges, 2012).
2. When using double letters, you will fingerspell the double letters in a sliding motion when the double letters are at the end of the words or bounce the double letter in the middle of the word (Bridges, 2012; Cartwright & Bahleda, 2007; Keast, 2005).

3. Lexicalized Sign. When fingerspelling, some letters are deleted. This is called deletion. An example of this would be when fingerspelling #BNK, which means "bank". The letter "a" has been deleted from the word (Bridges, 2012). Keast (2005) explains that some fingerspelled words are misspelled or letters are deleted due to fluidity of fingerspelling style. As well, sometimes two letters in a word may get switched, for example, light bulb which Deaf people tend to spell #BLUB. Another example of a lexicalized sign described by Mendoza (2006) is in regard to semantics related to #BACK. If you are talking about a trip, you will need to set up a start and end point of your trip somewhere in neutral space in front of you. If, for example, you are returning back home (B) from your trip (A) you will sign from this location (A) to location (B) in neutral space using fingerspell #BACK (A to B). Another example would be if you were talking about a girlfriend and boyfriend who had recently broken up but decided to get back together, you would fingerspell #BACK on both hands. The left hand would fingerspell #BACK while moving left to right and the right hand would fingerspell #BACK while moving right to left so both hands would meet (Valli & Lucas (1995).
4. Some fingerspelled words require movement and have their own style of movement. For example, when you fingerspell #EARLY you must fingerspell this word in a circular movement. Another example is #WOW which requires a back and forth movement when being signed. If you are familiar with these styles, then you will be able to identify the word (Bridges, 2012; Keast, 2005).
5. When you want to use a proper name, place, brand name, or title, you will need to fingerspell the word in full (Cartwright & Bahleda, 2007; Keast, 2005).

6. When discussing a technical term, medical term, scientific term or jargon, you are to always spell the word in full (Cartwright & Bahleda, 2007; Keast, 2005).
7. When fingerspelling acronyms, you will need to know that some acronyms will require the letters to be signed in a circular motion while others will be signed in a linear fashion. As well as, you will need to know the names of many Deaf organizations in your community, as they are typically referred to by their acronym (Bridges, 2012; Cartwright & Bahleda, 2007; Keast, 2005).
8. Compound words: Sometimes you will need to fingerspell the first part of a word then sign the second part of the word or the reverse. For example, when spelling "sunglasses": you fingerspell #SUN and sign glasses. Or when you sign "blackboard": you sign black then you fingerspell #BOARD (Bridges, 2012; Cartwright & Bahleda, 2007).
9. If during a discussion with a signer a concept arises and you do not know the signs to continue the discussion, you can fingerspell the concept to the signer. In this situation, you should not invent a sign that you feel may represent the concept (Keast, 2005).

The next section will focus on the rules of numbering, which are different and complex. ASL students should learn these rules, as they will use numbers daily. For this chapter, the researcher has only selected a few basic rules in order to provide a general understanding of these systems:

1. The numbers 1 to 5 (see Figure 4) are different than all other numbers. When you count using the numbers 1 to 5 or express the quantity of something using the numbers 1 to 5, the palm of your hand is facing back towards you. From numbers 6

to 10 (see Figure 4), you will need to twist your hand so the palm of your hand faces outwards, towards the person in front of you (Zinza, 2006).

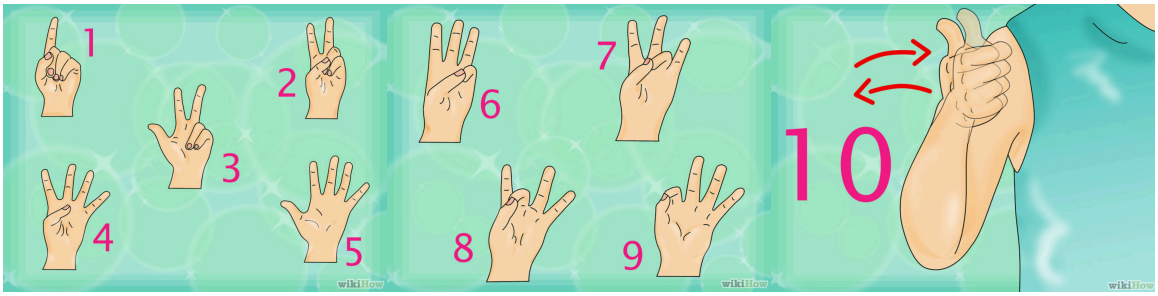



*Figure 4. Number one to ten retrieved from* http://www.wikihow.com/Count-to-100-in-American-Sign-Language

2. Numbers 11 to 15 (see Figure 5), include double opening and closing movements of the handshapes. For the numbers 16 to 19 (see Figure 6), your hand is required to twist twice to combine two different handshapes. For example, with the number 16, you will first use the sign for the number 10 and then sign the number 6. For the number 21 (see Figure 7), you will use the L handshape but your thumb will move up and down. For 23 to 29 (see Figure 8), a slight difference exists where you will combine two handshapes, the L and the number (i.e. Handshape L and 3 for 23). The palm of the signer will again face forward when signing the numbers 30 and higher. Again, you will sign the numbers by using the combination of the 3 handshape and the numbers (Zinza, 2006).

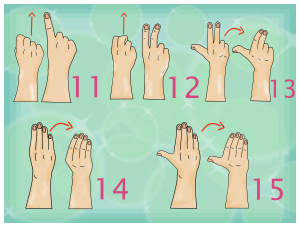



*Figure 5. Number eleven to fifteen*

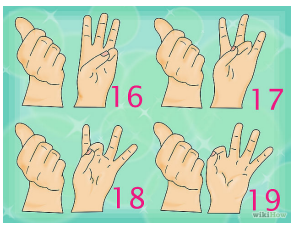



*Figure 6. Number sixteen to nineteen*

*Retrieved from* http://www.wikihow.com/Count-to-100-in-American-Sign-Language

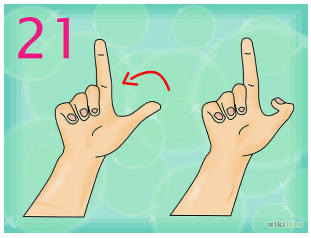



*Figure 7. Number twenty-one*

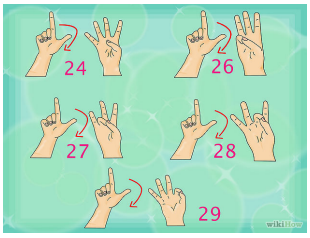



*Figure 8. Number twenty-four to twenty-nine*

*Retrieved from* http://www.wikihow.com/Count-to-100-in-American-Sign-Language

3. Exceptions to the rules above exist. There are two groups of numbers that require movement. The first group of numbers (67, 68 69, 78, 79 and 89) require your hand to move toward your body. The other group, which does not follow the rules of numbering (76, 86, 87, 96, 97 and 98) requires your hand to move in the opposite direction (Zinza, 2006).
4. When signing a four-digit number, you can sign the numbers individually or group them into pairs. For example, the number 5067, you can sign as "50" and "67" or as individual numbers 5-0-6-7 (Mendoza, 2006; Zinza, 2006).
5. If you are signing a phone number, age, address or other types of longer numbers (i.e. health card number or credit card number), you will, for the numbers 1 to 5, have the palm of your hand facing out to the other person. Any numbers larger than 5 will follow the rules listed above. If you are using numbers to identify a year, phone number, credit card or other long number, you can also follow the four-digit rule explained in number 4. An example of this would be the year 2014 which can be signed as "20" and then "14" (Mendoza, 2006; Zinza, 2006).

This brief overview of some of the rules[6] involved in using fingerspelling and numbering appropriately when signing should provide an idea of how complex and challenging it can be to become proficient in these practices. It is also important to mention that the intricate alterations to movements, palm orientation, and hand positioning are not random, but are structured to visually maximize the phonological (visually-based) contrasts in the signs. This makes it possible to attune our eyes to perceive the slight changes in the movements of the signer's fingers. In this way, signed languages are ideally suited to be processed visually. For this reason, it is also important for second language learners of ASL to know the rules and acquire the skills, as it makes it easier to connect to the meanings, or make sense of the signs.

**Conclusion**

From the literature the researcher has reviewed, it should be clear that ASL is a complete and true language. Historically, ASL is linked to French Sign Language, but through a variety of other influences it has developed its own separate vocabulary and unique grammatical structures. Fingerspelling originated from connections to written languages however, it has become an integral part of signed languages, including ASL, and has evolved to fit with visual processing. The research, and my own experiences, emphasize that fingerspelling and numbering play a unique role in ASL and are frequently a challenge for second language learners of ASL. Some reasons for these challenges have been uncovered through research, particularly arising from studies that compare the differences between how children versus adults acquire these skills. This

[6] There are numerous additional rules that have not been described. For example the complex rule of numbers for money, where you twist your hand for one to ten dollars but you do not twist your hand for 11 or more dollars, and instead sign the number of "11" and sign "DOLLAR".

has resulted in a focus on teaching second language learners of ASL to process fingerspelling more holistically, rather than focusing on individual handshapes and letters. The reality is that research regarding how to effectively teach fingerspelling and numbering skills is limited. We do not know whether courses specifically addressing these practices enhance students develop in this area, or whether it is more beneficial to simply include them within a general ASL curriculum. The current study will begin to address this need and provide some insights into how best to facilitate second language learners practices in ASL fingerspelling and numbering. The methods used to approach this problem are presented in the next chapter.

# Chapter 3: Method

Across Canada, there are several colleges that offer programs in the field of Deaf Studies. Included in these institutions are Vancouver Community College, Red River College, George Brown College and Nova Scotia Community College. With a limited number of colleges that offer an education in Deaf Studies, accordingly, there a limited number of Deaf instructors that teach them. As a result of these limitations, research is often difficult to obtain when looking to improve existing programs and curricula. With this in mind, the fingerspelling and numbering research that has been conducted for this study will contribute to the knowledge base of all Deaf Studies Programs across Canada.

## Study Design

The experimental design of this study involved administering a pre-test with all participants to establish a baseline measure of their ASL fingerspelling and numbering receptive skills and rule knowledge. The participants then continued in their regular Deaf Studies courses for one semester. At the completion of the semester the same test (post-test) was administered to measure any gains in their receptive fingerspelling and numbering skills and knowledge.

This study targeted the students from several Deaf studies Programs in Canada, programs that follow a similar curriculum and that require students to complete Signing Naturally Level 1 (Smith, Lentz, and Mikos 1988) before entry. Due to the similarities outlined above, comparing the curricula used by these Deaf Studies Programs was the most appropriate with regard to students' success in receptive fingerspelling and numbering skills. It was paramount for the success of this research to gain research and ethics approval and secure participation from participants in these specific programs.

In this study, the students from the Deaf Studies programs who were involved in this research, were requested to complete a pre-test, post-test and survey while their instructors were asked to participate in an interview portion of the research. Based on the information collected from these programs, the researcher analyzed the students' receptive skills and knowledge of basic rules of fingerspelling and numbering over a three-month duration.

**Sampling**

The participants surveyed were students who were enrolled in the Deaf Studies Programs from the previously specified colleges in Canada. For the purposes of this study, one of the programs was considered the target group as they offered a separate fingerspelling and numbering course to their students in addition to ASL courses. The other programs were considered the comparison groups as they only offered students ASL courses without a separate fingerspelling and numbering course. The average expected number of students per class consisted of a small sample size, roughly 10 to 20 students. As well, given the type of field these students are looking to specialize in, the majority were female, non-deaf, between the ages of 18 to 30, has recently completed high school and successfully completed *Signing Naturally: Level 1* (Smith, Lentz and Mikos, 1988) prior to entering the program. The goal was to receive a minimum of 10 participants from each program.

The other participants involved in the study were the instructors who teach ASL and/or fingerspelling and numbering in the aforementioned Deaf Studies Programs. All instructors were asked to take part in an interview (no more than forty minutes in length) conducted either via videoconference or in person at the end of the study. The interview

gathered information about teaching activities and materials that instructors use in their classes, and specifically determined how fingerspelling and numbering was being taught. It was expected that the instructors were Deaf, their first language was ASL, they would have at least five or more years experience teaching and working full time within their respective programs. These criteria were selected to ensure that the instructors had a strong background in teaching and a great deal of knowledge regarding ASL instruction and would therefore, have a variety of experiences to share during the interviews. Additionally, it was expected that they would all have obtained postsecondary education (completed a bachelor's degree).

**Ethical issues**

The cover letter that was sent to a select number of Deaf Studies Programs across Canada, explained that the information collected from the students would be kept confidential and anonymous and that the tests were not related to their courses in any way. Also, the students would be identified by the use of assigned code numbers. These code number would be known only to them and kept in a sealed envelope between testing sessions in order to maintain their anonymity during analysis of their tests and survey responses. As a result, students were not required to sign and submit consent forms, but were provided with a letter of invitation (Appendix D and F) and a cover letter (Appendix E and G). The cover letter also explained that the pre and post-tests would simply be used to identify their progress during the study's timeframe. It was also explained that after the publication of this thesis, all information collected including surveys, pre-tests and post-tests would be destroyed.

Preceding any testing, the students were made aware of their option to withdraw

from the survey, pre-test or post-test at anytime or choose not to participate. All students received the results of the study from their coordinators who distributed copies to all the students regardless of their participation or lack thereof in the tests and surveys.

For the instructors who chose to participate in the study, their information was documented anonymously and later destroyed upon completion of the study. The only name that will appear on this study will be mine. If instructors are interested in receiving the results of this study, it will be sent to them by email once all findings have been published.

Researchers applying to a University of Manitoba Research Ethics Board for research involving humans must include a certificate of permission to processed from the from the Education/Nursing Research Ethics Board (ENREB) and must complete an online tutorial, TCPS 2: Course on Research Ethics (CORE). The researcher completed the TCPS 2: Course on Research Ethics in July 2014 and the study was approved by the Ethics Board (Appendix J) at the U of M on October 8, 2014.

**Researcher Role**

As the researcher of this study, it fell upon me to clearly establish expectations for both the participants and myself and thus, needed to clarify everyone's respective roles in order to avoid conflicts or confusion. It was important for me to remain neutral and professional, as I am one of the instructors from the Deaf Studies Program at Red River College. As the researcher, I chose to not teach the fingerspelling and numbering course in order to maintain neutrality, however, I still taught the American Sign Language courses. It was my responsibility to ask the coordinators from these program to let the participants know that the pre-test, post-test and survey would not affect the participants'

involvement in their respective programs. In fact, the coordinator and instructors of the programs would not receive any information about the results of these measures. In addition, the coordinators, or someone they designated distributed a letter of invitation and a cover letter inviting the students to participate in the study, which included an envelope to return with the number-coded cover letters, and then they left the room for the duration of the test. Each letter of invitation had an assigned number code that the students would entered when completing the survey and tests. Upon the completion of the survey and pre-test, the participating students wrote their names on their number-coded letter and placed it in the envelope. The envelope was then sealed and kept with the program coordinator until the time of the post-testing (end of January). At that time, the coordinator again provided the students with the envelope so they could use the same number code to complete the post-test. This allowed the researcher to compare individual scores without revealing the identity of students to any program personnel. The details on how the test was delivered will be described in the Data Sources section below.

The student tests and the surveys were received upon completion of each but did not analyze the pre-test, post-test or survey until the semester had ended. The test forms received were number coded so that I, the researcher was not aware of any participants' names. After the pre-test, the envelope that contained the number-coded letters and the students' names (in case they needed to verify their code for the post-test) were kept by the coordinators in a secure place and never opened. The students were then instructed to destroy their number codes once they had completed the post-test. Upon publication of

the thesis, a copy of the summary will be sent to the coordinators who will then distribute to all the students.

**Data Sources**

Close attention was paid to the data collected in order to aid in responding to the research question regarding the potential benefits of a separate fingerspelling and numbering course. Data sources included a pre-test, post-test and survey for student participants, and interviews with instructor participants. Each of these sources is discussed in more detail in the following sections.

**Pre-test and Post-test**

The pre-test (see Appendix B) and post-test (see Appendix B) were designed to test the students' receptive skills using common, and basic fingerspelling and numbering rules in order to evaluate their progress and knowledge. The pre-test and post-test followed the same structure. The receptive skills pre-test and post-test focused on what level of comprehension the students had when receiving fingerspelled and numbered information from a Deaf individual. The tests also monitored the level of familiarity of fingerspelling and numbering rules. This was used to measure the students' knowledge of fingerspelling and numbering rules and measured the students' ability to comprehend fingerspelling and numbering in an appropriate manner.

The receptive test consisted of a video approximately 10 minutes in length with three different Deaf signers. The Deaf individuals each told a story, which included both fingerspelled words and numbers. The students accessed the video and completed the tests through a code restricted website on their computers in class. The students were strongly encouraged to have a pen and paper ready to make notes of fingerspelled and

numbered items from the video. The students were given time to watch each signer's story once (but they were permitted to pause the video as often as needed), and instructed to pay close attention to any fingerspelled or numbered information in the videos and to document these items immediately following the viewing. The participants were required to type their responses into the spaces provided on the electronic test forms to document these items. This process was followed for each signer and their story. The test and survey were all developed by the researcher using a template from the fluid surveys website.

The students were asked to take the pre-test during the middle of the first semester and the post-test in mid January in order to allow the researcher to compare and analyze the students' progress throughout an extended period of time. This also ensured that a sufficient amount of material was obtained to successfully complete the study. The results were then used to compare the amount of success achieved by the students in the target group to the students in the comparison group.

The rationale behind choosing to study students' progress over a 3-month period was as follows: At the end of a semester, all the students would have had the opportunity to study ASL at length, allowing them the time to better understand fingerspelling and numbering as well as the rules for their use. It was expected that this experience would aid them in answering the questions on the post-test in more detail, and would also give them a better understanding of their level of ASL and fingerspelling and numbering skills.

**Survey**

A survey (see Appendix A) with three sections of questions was handed out to the students in order to collect data regarding: 1) defining characteristics of participants (i.e.,

gender, age and so on): 2) education specific to American Sign Language: and 3) education specific to fingerspelling and numbering. This information aided in establishing baseline measures for the participants in order to allow for more educated comparisons of the data collected.

The questions in each section of the survey identified how many students were in each age category, whether or not they had a hearing loss, if they had any deaf family members, both immediate and distant, their level of involvement in the Deaf community, and their experience with ASL. All this aided in identifying whether there was a significant relationship between these categories or not. The reason behind identifying a similarity or common thread within a cohort may have helped to answer some questions. For instance, perhaps a certain group of students felt they did not need to be taught fingerspelling and numbering outside of their ASL course while another group of students from another college, or with other characteristics, felt that they would benefit from a separate fingerspelling and numbering course. Information such as this may have an impact on the structure of their program.

The questions in the "Fingerspelling and Numbering Course" section of the survey identified whether or not students wanted to have a fingerspelling and numbering course separate from their ASL courses. In this section, the students had the opportunity to share their opinions. The students reported their experience when reading a Deaf person's fingerspelling and numbering and their success or struggles. As well, this section offered the students the opportunity to rate their own level of fingerspelling and numbering fluency.

**Interview**

The next portion of the study turned its focus to the instructors of the programs involved in this research. The instructors from the Deaf Studies Programs were interviewed (see Appendix C) through videoconference or in-person during the middle of the second semester, after the completion of the students' post-test. First, the instructors were asked a few personal questions such as what their first language was and the level of exposure/experience they had to that language growing up. Next, they were asked about their educational background, what level of education they held, their major or minor in relation to a university degree, years of teaching experience, number of courses they taught and whether or not they were employed on a full time or part time basis. Finally, the remaining questions focused on their experience with their students specifically in relation to fingerspelling and numbering. They were asked for their opinion regarding separate fingerspelling and numbering courses from ASL courses as opposed to an ASL course that encompasses everything and which they felt would most likely aid in educating future students. The question in this final section was kept open-ended to encourage the participants to express their experiences and ideas related to this topic.

**Instruments**

The packages were mailed to the coordinator of each program in early October 2014, the middle of their first semester. The letter of invitation and cover letter for the pre-test and survey for the students were also included. In early January during the second semester of the school year, the letter of invitation and cover letter for the post-test were mailed. The package contained instruction to the coordinators about how to implement the survey and test procedures for the students. The coordinators were asked

to confirm that they had received each package by email. At that time, arrangements for a video conference meeting with the coordinators were made in order to go through the procedures of the pre-test, post-test, and survey to ensure the coordinators understood the purpose for the data being collected. They were asked to schedule the pre-test and survey during the last two weeks of October of their first semester, as well as schedule the post-test in late January during the second semester. The test and survey were taken either during or outside of class time. A minimum of one hour was needed for both the pre-test and post-test with an additional half hour for the survey. When dates had been confirmed for both the pre-test, post-test and survey, the coordinator was requested to inform the researcher.

In October of the first semester, the coordinators were asked to distribute the letter of invitation and cover letter to all students in their program and explain the test procedure to them. The letters, which were reviewed with the students by the coordinator or another staff member, explained that they would be completing three sections of the survey on two separate occasions. The first would include the pre-test and survey which took place in their first semester during the last two weeks of October. The post-test was conducted in January of the second semester. The letter also explained to the student that the information collected would be kept confidential and anonymous. In addition, they were also informed that if they chose to participant in this study, they could refuse to answer any questions or withdraw from the study completely at any time without penalty. The surveys or tests that the students completed as part of the study would not influence their standing in their courses in any way. The last instruction given to the students was to sign their name on the cover letter they received to ensure that only they would be

using the unique number code on each letter. After explaining these details, the coordinators or other staff member left the cover letter with the number-codes on a table and left the room to ensure that the students' participation or lack thereof would remain anonymous. The students were then left to review the cover letter and to decide whether or not they wanted to participate. The letters, signed or unsigned, were put into an envelope at the front of the room and were sealed by a classmate to ensure no one could review their contents. This allowed the students access to their unique code in case they forgot the number in the post-test. By using only unique number codes to identify participants, the students remained nameless individuals during the analysis of their fingerspelling and numbering receptive skills and comprehension of their rules. The sealed envelope that contained the cover letters was left with the coordinator of each program until the post-test at which time it was left at the front of the room during the post-test allowing only the students to access it in case they needed to retrieve their unique code. The researcher did not have any access to the number codes or the sealed envelopes at any time, however the researcher did electronically save the pre-test and survey data in a secured file.

In January, during the second semester of the year, the coordinators distributed the letters of invitation and cover letters to the students explaining the procedure of the post-test, which followed the same procedures as the pre-test. The coordinators not only distributed the letters for the post-test but also brought the sealed envelope containing the students' signed letters from the pre-test. After the coordinator left the room, the students were able to access the envelope if needed to ensure they were using the same unique number, safeguarding that the researcher was comparing individual scores accurately—

all without revealing the identity of students to any program personnel. In the post-test cover letter, the participants were instructed to destroy their signed cover letter and unique number code. Upon completion of the post-tests, the researcher electronically saved the post-test data to a secured file.

At this point in the research where the data collection was completed, the researcher destroyed all of the pre-tests, post-tests and surveys.

The allotted times each college had booked for the pre-test, post-test and survey were documented by the researcher and a reminder to the coordinators was sent out one week before the scheduled dates. If for some reason the pre-test, post-test, or survey did not take place during the scheduled time, another reminder was sent out within a few days of the original date reminding them to reschedule the test or survey.

Upon completion of the students' survey and both tests, a letter of invitation (Appendix H) was emailed to each of the instructors and coordinators to ensure everyone had the opportunity to participate in the interview component of the research. Once they had accepted to participate in the interview, their consent forms were sent to them (Appendix I). The interviewing process began upon receiving signed consent forms from the instructors. They were interviewed through videoconference or in person at the end of the semester. The coordinators' and instructors' names were not be used in the transcriptions of the interviews or any other written documentation. The participants were given an opportunity to read the transcription after the interview and confirm the accuracy of their comments**.** After, the instructors' transcriptions were accepted, the data from the interviews were summarized according to each interview question and analyzed

according to the research questions. Upon completion of the study in October 2015, the video and written documentation will be destroyed.

**Data Analysis**

The goal for this survey was to have more than 10 Deaf Studies students from each college participate in the study. If these numbers were met, then the study would focus its research on approximately 20 participants. An additional goal was to have a minimum of two instructors participate in the interviews. In the end, a total of 15 students participated the survey, 10 students completed the pre-test and 5 students continued on to complete the post-test from two colleges. A total of five instructors from three colleges, were interviewed. The low number of student participants was disappointing and significantly influenced the findings of the study as discussed in more detail in the next chapter.

The process of analysis began by first focusing on the pre-tests. The tests from both colleges were studied, measurements of fingerspelling and numbering characteristics were made and analyses of the variables that contribute to these scores were conducted. Each student was first evaluated individually in order to identify specific variables relating to fingerspelling and numbering abilities. The students were then compared to each other to identify the differences within the variables of each group. Next, the analysis focused on the post-tests. The same procedure was followed, where each student was analyzed independently for specific variables that influence test scores. The students were then compared to each other to again identify the differences within the variables of each program in regards to fingerspelling and numbering specifically. Next, the study analyzed and compared the pre-tests and post-tests from each college individually in

order to identify any correlation or differences between the tests. After this analysis, the variables found in each group of students were compared with the variables found in the other group of students to see if any relationships could be determined between them. Finally, the study reviewed the responses from the survey and compared them to the variables identified in the pre-test and post-test comparisons in order to identify any relationships between variables. The results were to ultimately show if there were significantly different correlations between students from the college that offered the fingerspelling and numbering course compared to the college without the fingerspelling and numbering course.

The interview data was analyzed by comparing the instructors' background, their first language used at home, what level of education had they obtained, years of teaching experience, the number of courses taught, whether or not they were employed full time or part time, and the kinds of strategies and materials they used in their teaching. All these variables were used to identify the impact that they may or may not have had on the students' learning of fingerspelling and numbering.

# Chapter 4: Results

## Introduction

In this study data was collected in the form of written surveys, test results (pre-test and post-test) from students, and interviews from instructors of Deaf Studies Programs across Canada. In the first portion of this chapter, a summary of the findings from the survey, are discussed. The survey and details regarding the participants can be found in Appendix A and Table 1.1 to 1.4. In the second portion of this chapter, while referring to Table 2.1 to 2.4 and Table 3.1 to 3.3, a comparison of the pre-test and post-test results can be found in Appendix B. Both the pre-test and post-test, which were conducted through the use of three videos, were comprised of two sections. The first section tests receptive skills while the second tests the participants' knowledge of fingerspelling and numbering rules. Results from the tests can be found in Tables 4.1 – 4.8. In the last portion of this chapter, a summary of the six interviews conducted will be discussed.

## Part 1: Survey

The survey was completed by a total of 15 participants who were enrolled in two Deaf Studies Programs across Canada. The analysis of the survey was divided into four sections. These four sections considered the participants' personal background, their background with American Sign Language, their thoughts on fingerspelling and numbering courses, and their fingerspelling and numbering skill level. Further discussion of each of these sections can be found below.

**Personal background**

Most of the students who participated in this research were between 17 – 24 years of age, with the exception of three students who were in the following categories, 25– 34 years of age, 35 – 44 years of age, and 45 – 54 year of age. All of the student participants were non-deaf. Two students had Deaf immediate family members while a few other students had extended family members who were Deaf. As well, most of the students had Deaf friends whom they have known for less than two years, with the exception of two students who have had friendships with Deaf individuals for more than five years. Roughly one-third of the students have been participating in Deaf community events for less than two years while the other two-thirds have not had any involvement in the Deaf community. Two students identified themselves as having been involved in the Deaf community for more than five years. This information is summarized in Table 1.1 below.

The typical profile of a Deaf Studies Program student upon enrolment generally is a younger individual who has recently graduated from high school, and has little experience with ASL and the Deaf community. Many potential DSP students find they are lacking the Signing Naturally Level 1 course (Smith, Lentz, and Mikos 1988) requirement for acceptance to the DSP and so will often take a year to complete this requirement before applying. The DSP rarely sees applications from individuals with immediate family members who are Deaf. These individuals often times have been raised with Deaf culture and ASL as a large part of their lives and so stand to gain little knowledge from the DSP. The typical applicants on the other hand, have very little knowledge and experience with Deaf culture and ASL, therefore, they stand to gain a great deal of knowledge from the program. These students typically do not have Deaf

family members or close Deaf friends. They also have little to no involvement in the Deaf community prior to enrolment in the DSP due to their limited ability with ASL and understanding of Deaf culture and norms. Once enrolled in the Deaf Studies Program, the students are required to participate in the Deaf community for assignments, in order to gain experiences by interacting with Deaf people.

**Table 1.1 Personal Background**

| Age | 17-24 | 25 - 34 | 35 - 44 | 45 -54 |
|---|---|---|---|---|
| Number of Students | 12 | 1 | 1 | 1 |

| | Deaf | Non-Deaf |
|---|---|---|
| Number of Students | 0 | 15 |

| | Any immediate family members who are Deaf | Any Extended family members who are Deaf |
|---|---|---|
| Number of Students | 2 | 5 |

| Any Deaf Friends and for how long | More than 5 years | 3 to 5 years | About 2 years | Less than 1 year |
|---|---|---|---|---|
| Number of Students | 2 | 0 | 3 | 4 |

| Participation in the Deaf community and for how long | More than 5 years | 3 to 5 years | About 2 years | Less than 1 year |
|---|---|---|---|---|
| Number of Students | 2 | 0 | 1 | 2 |

**American Sign Language Background**

Table 1.2 summarizes the students' level of ASL education at the time the study was conducted. All of the students had completed Signing Naturally Level 1 (Smith, Lentz, and Mikos 1988) and almost half of the students had either completed or were

currently taking Signing Naturally Level 2 (Lentz, Mikos, and Smith, 1989) in their Deaf Studies Program. A small number of students had also completed Signing Naturally Level 3 (Mikos, Smith, and Lentz 2001). None of the students had taken the Master ASL level 1 (Zinza, 2006) or Master ASL level 2 (Zinza, 2006) courses. The majority of students had used ASL for roughly one to two years prior to entering the Deaf Studies Program. Of the remaining participants, one had used ASL for three to five years while three others had been using ASL for more than nine years. The majority of students felt their ASL level ranged from novice to novice/intermediate. Three students categorized their ASL skills as intermediate to intermediate/advanced while only two students felt their skills were at an advanced ASL level.

In the survey, the participants were asked to rate their ASL skill level. The majority identified this level as being in the moderate to intermediate range. Although the students were not asked to offer reasons to support their responses, their ratings seemed accurate when taking into consideration their limited experience in the Deaf community and their limited courses in ASL (usually just Signing Naturally Level 1). Signing Naturally Level 1 (Smith, Lentz, and Mikos 1988) is a pre-requisite for students to enroll in the DSP in both colleges. Additional courses such as the Masters ASL level 1 or 2 (Zinza, 2006) are not available in Canada yet, meaning no one would have had the opportunity to take this type of advanced course. Interest or fascination with ASL among DSP students typically stems from new friendships with Deaf individuals and the desire to communicate or simply the intrigue of learning a new language. This newfound interest usually means that the majority of the students have used ASL for roughly one to two years prior to entering the DSP. Those participants who had Deaf immediate family

members identified themselves as having advanced ASL signing skills as typically they were required to use ASL daily to communicate at home, (meaning their first language was ASL). By having the students identify their ASL level, ASL signing skills and the number of years using ASL, the researcher was able to consider these factors in the analysis of their fingerspelling and numbering abilities. Students with Signing Naturally level 1 or 2 (Smith, Lentz, and Mikos 1988 & 1989) and only a limited number of years using ASL tended to be less fluent in their fingerspelling and numbering receptive skills.

**Table 1.2 American Sign Language Level**

| ASL Level | Signing Naturally Level 1 | Signing Naturally Level 2 | Signing Naturally Level 3 | Master ASL Level 1 | Master ASL Level 2 |
|---|---|---|---|---|---|
| Number of students | 3 | 6 | 4 | 0 | 0 |

| Use ASL prior entering DSP | More than 9 years | 6 - 8 years | 3 - 5 Years | 1 - 2 years | Less than 1 year | None |
|---|---|---|---|---|---|---|
| Number of students | 3 | 0 | 1 | 8 | 2 | 1 |

| ASL signing skills | Novice | Between novice and intermediate | Intermediate | Between intermediate and advance | Advance |
|---|---|---|---|---|---|
| Number of students | 4 | 6 | 2 | 1 | 2 |

**Fingerspelling and Numbering Course**

When the student participants were asked their opinion regarding where fingerspelling should be taught, approximately half felt it should be taught separately from their ASL courses while the other half were not sure if it was necessary to separate the courses. When asked if it would be beneficial to learn more specific elements related

to fingerspelling and numbering, more than half of the students strongly agreed or agreed while less than half of the students were not sure if it would be beneficial. Five students added comments in regard to separate fingerspelling and numbering and ASL courses. Their comments were as follows:

#1 student: "I think it would help people's receptive skills since receiving fingerspelling and dates is one of the hardest things to understand."

#2 student: "I think it is beneficial to other students, however, I don't feel as though this class benefits me enough for me to be in it."

#3 student: "Fingerspelling is often one of the most challenging things for students, therefore, I think it is important for students to concentrate on this area separately from the vocabulary signing."

#4 student: "If class time is wisely used and use wisely I think it would be not necessary."

When asked if an additional fingerspelling and numbering course should be added, all but four students felt an additional course was needed. Five students added comments regarding the additional fingerspelling and numbering course. Their comments were as follows:

#1 student: "I think there are other crucial areas that could benefit from more focus."

#2 student: "I think this would be incredibility beneficial for ASL students. Particularly a course for practicing receptive skills for fingerspelling and numbering."

#3 student: “I am finding the fingerspelling and numbering course to be very helpful in learning other aspects of ASL.”

#4 student: “I have noticed that other students struggle the most with fingerspelling, so I think maybe the class should involve more basic practice in both receptive and expressive skills. However, this would not benefit me at all.”

#5 student: “I think it would be a neat asset.”

From all the students who participated in the survey, only four students felt they would prefer to use an American fingerspelling and numbering workbook, as opposed to the rest of the group who felt they would prefer to study from a Canadian fingerspelling and numbering workbook.

With regard to how many levels of fingerspelling and numbering courses should be offered in their Deaf Studies Program, two participants felt four levels of fingerspelling and numbering courses should be offered while five other participants would like to have three levels offered. The remaining participants felt one or two levels of fingerspelling and numbering would be sufficient. Of the participants, four students suggested that one to three hours of fingerspelling and numbering per week would be satisfactory, while a few students felt that one and a half or less than one hour of fingerspelling and numbering per week would be sufficient teaching time. Table 1.3 represents the students’ responses regarding fingerspelling and numbering courses.

**Table 1.3 Fingerspelling and Numbering Course**

| Fingerspelling and numbering course separate | Yes | No | Not sure |
|---|---|---|---|
| Number of students | 7 | 1 | 7 |

| Beneficial to learn more specific elements related to fingerspelling and numbering | Strong agree | Agree | Not sure | Disagree | Strong disagree |
|---|---|---|---|---|---|
| Number of students | 6 | 3 | 6 | 0 | 0 |

| Addition fingerspelling and numbering course | Yes | No |
|---|---|---|
| Number of students | 11 | 4 |

| Canadian fingerspelling and numbering workbook | Yes | No |
|---|---|---|
| Number of students | 11 | 4 |

| Fingerspelling and numbering level | One | Two | Three | Four | Five |
|---|---|---|---|---|---|
| Number of students | 4 | 4 | 5 | 2 | 0 |

| # Hours per week for fingerspelling and numbering course | Less than one hour | One hour | One and half hours | Two hours | Three hours |
|---|---|---|---|---|---|
| Number of students | 2 | 4 | 1 | 4 | 4 |

**Fingerspelling and Numbering Skills**

Table 1.4, which can be found below, represents the students' perception of their skills and comprehension of rules with regard to fingerspelling and numbering.

When rating their ability to read a Deaf individual's fingerspelling and numbering, most of the participants felt their ability to comprehend as "very difficult" to "difficult". Five students rated their experience as "easy" while only one student thought her/his ability to read a Deaf individual's fingerspelling and numbering was "very easy" to read. A small number of participants were unable to rate their ability to read a Deaf individual's fingerspelling and numbering.

Most of the students acknowledged they sometimes feel nervous when reading a Deaf individual's fingerspelling and numbering, while four student identified that they always or most of the time felt nervous when reading a Deaf individual's fingerspelling and numbering. Two students stated they did not experience nervousness when reading a Deaf individual's fingerspelling and numbering.

When considering their comfort level when using fingerspelling and numbering in conversations, half of the students felt comfortable more or all of the time while the other half of the students felt comfortable only sometimes.

With regard to fingerspelling and numbering skills, most of the participants rated their skills as moderate, while a few rated their skills at a very fluent or fluent level. A small number of participants perceived their fingerspelling and numbering skills as not fluent. While a large number of the participants identified their knowledge of fingerspelling and numbering rules to include all to some rules, a few students felt they only knew a few, and a few others were not sure how many rules they knew.

Most of the students rated their fingerspelling and numbering skills as moderate but in other responses indicated they sometimes felt nervous when reading a Deaf individual's fingerspelling and numbering. These numerous contradictory responses suggest that some participants may have overrated their fingerspelling and numbering skills. When an ASL learner is conversing with a Deaf individual or being instructed in ASL, the Deaf individual will reduce her/his signing speed to ensure comprehension. Typically, Deaf individuals will not point out errors in fingerspelling or numbering as their attention is on the conversation as a whole. This may lead the ASL learners to believe their receptive skills are more advanced than they really are. Additionally, when reviewing the test results, many students did poorly on the receptive portion. It is common for students to identify that sometimes or most of time they feel confident using fingerspelling and numbering because they have control of their output but will experience nervousness when receiving, as they have no control over another's output. More over, the students noted that they knew either some or most of the fingerspelling and numbering rules. Their responses were correct to some degree as they had learned many rules in their DSP studies but were unaware of the many rules they had yet to learn.

**Table 1.4 Fingerspelling and Numbering Skills**

| Reading a Deaf individual's fingerspelling and numbering | Very Difficult | Difficult | Not sure | Easy | Very easy |
|---|---|---|---|---|---|
| Number of students | 4 | 3 | 3 | 4 | 1 |

| Nervous when reading a Deaf individual's fingerspelling and numbering | All the time | Most of the time | Sometime | Not at all | Don't know |
|---|---|---|---|---|---|
| Number of students | 2 | 2 | 9 | 2 | 0 |

| Comfortable using fingerspelling and numbering | All the time | Most of the time | Sometime | Not at all | Don't know |
|---|---|---|---|---|---|
| Number of students | 4 | 3 | 8 | 0 | 0 |

| Fingerspelling skills | Very Fluent | Fluent | Moderate | Not Fluent | Don't know |
|---|---|---|---|---|---|
| Number of students | 1 | 3 | 8 | 3 | 0 |

| Numbering skills | Very Fluent | Fluent | Moderate | Not Fluent | Don't know |
|---|---|---|---|---|---|
| Number of students | 0 | 3 | 7 | 5 | 0 |

| Fingerspelling Rules | All | Most | Some | Few | Not sure |
|---|---|---|---|---|---|
| Number of students | 3 | 4 | 5 | 2 | 1 |

| Numbering Rules | All | Most | Some | Few | Not sure |
|---|---|---|---|---|---|
| Number of students | 2 | 4 | 6 | 2 | 1 |

The majority of participants identified themselves as non-deaf, between 17 – 24 years of age, and as having used ASL for one to two years, with an ASL level of Signing Naturally level 2 (Lentz, Mikos, and Smith 1989). The majority felt that their ASL signing skills were novice to intermediate, while a small number who had immediate Deaf family members—deaf relatives in their extend family or Deaf friends for more than

5 years—identified their ASL level as higher than Signing Naturally level 2 (Lentz, Mikos, and Smith 1989).

In the survey, the participants were asked if they would like to have a fingerspelling and numbering course separate from their ASL. The responses were split almost down the middle with roughly half saying they would while the other half would not. Interestingly, they were later asked if they thought an additional fingerspelling and numbering course should be added to their course load. The majority of participants felt this would be beneficial to their studies. This difference in responses may have been due to confusion regarding the meaning of the question. Some students may have understood the question to be whether they thought an additional course to the one they were already taking would be beneficial. These students may have felt that two separate courses were not necessary. In addition, the majority of participants felt it would be beneficial to have a Canadian fingerspelling and numbering workbook.

Most of the participants acknowledged that at times they were nervous and had difficulty reading a Deaf person's fingerspelling and numbering. However, they did feel comfortable incorporating fingerspelling and numbering in their signed conversations. Their fingerspelling and numbering skills were mostly moderate and their knowledge of fingerspelling and numbering rules ranged between some to most.

**Part 2: Pre-test and Post-test**

In this portion of the study there were a total of eleven participants, ten of whom took part in the pre-test, six in the post-test, and five participants who took part in both the pre and post-tests. Investigations of the results began by focusing first on the data from the receptive portion of the tests and later the responses from the fingerspelling and

numbering rules portion. Analysis of each section initially included the test results of all participants, regardless of whether or not they completed both tests, and later the focus narrowed to the five individuals who completed both the pre-test and post-test.

**Receptive skills analysis of all participants**

In this section special attention was given to the receptive skills component of the pre-test and post-test where the students watched three videos in order to test their skills. Regardless of whether or not they took part in only one test or both, the first portion of the pre-test and post-test was analyzed. In all sections of the analysis, each fingerspelled word from the videos has been identified as "items". As well, the word "score" was chosen to better distinguish the number of correct or incorrect responses made by the students. Results can be found in Tables 2.1 through 2.4 following my analysis of the data collected.

Table 2.1 exhibits the number of times students correctly received the fingerspelling or numbering included in either the pre-test and/or post-test from the three videos.

In the first video the "Boat Accident", 31 separate instances of fingerspelling or numbering can be found. During their initial pre-test viewing, the majority of participants correctly received no more than five items with only four other students correctly receiving almost half of the fingerspelled words or numbers. One participant, without documenting any reasons, chose to not offer any answers after watching the boat accident video. The results of the post-test viewing of the "Boat Accident" video were similar in that half of the students scored below 10 while the other half correctly received roughly half of the 31 items.

The second video to be viewed was the "Bad Luck" video, which included a total of 35 fingerspelled or numbered items. During the pre-test viewing only two students correctly received more than 20 items while the rest of the participants scored nine correct items or less. During the post-test viewing, only one participant scored well, correctly identifying 19 items. Another participant successfully identified 11 items while the other participants identified only five items or less.

The final video to be viewed was the "Photography" video, which included 36 fingerspelled or numbered items. During the pre-test viewing three students scored particularly well with scores over 19 while the other students' scores remained low. Two students, without offering reasons why, opted to not attempt this video in the pre-test. During the post-test viewing three students scored 21 or more points while the three other students received eight or less items correctly.

In this section the results of each student's pre-test and post-test scores from Table 2.1 were compared. For the "Boat Accident" video, two students increased their scores by two to four points from the pre-test to the post-test, one student increased her/his score by 10 points, one student's score remained the same while one student's score decreased by one point.

When comparing the pre-test and post-test results of the "Bad Luck" video, two students maintained the same score, one student increased her/his score by two points and another two participants dropped two points from the pre-test to the post-test.

In the "Photography" video, one student increased her/his score by two points, two students maintained the same score for both the pre and post tests, while one other participant dropped two points in her/his post-test results.

In this section the pre-test and post-test results of only the five students who participated in both tests were compared. More specifically the results of the three videos are compared to see if any improvements in their receptive skills can be found. The results of their tests are documented in Table 2.1.

Student #1, in this analysis, generally showed very little improvement in his/her receptive skills throughout the three videos. With the first video a great deal of improvement was seen but in the case of the two other videos, her/his score only increased by two points. Student #2 showed a small improvement in the first video only with an increase of two points. In the second and third videos no improvement was seen, in fact a two-point drop in theis student's score was noted. Students #5 and #7 generally maintained their scores throughout the videos, with the exception of student #5 dropping one point with the "Boat Accident" video, and student #7 increasing her/his score by three points in the "Photography" video. Student # 6 improved receptively in the first video, dropped in the second and maintained the same score in the third video.

**Table 2.1 Comparing pre-test and post-test score**

| | Boat Accident Score (Out of 31) | | Bad Luck Score (Out of 35) | | Photography Score (Out of 36) | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| 1 | 5 | 15 | 9 | 11 | 19 | 21 |
| 2 | 13 | 15 | 21 | 19 | 27 | 25 |
| 3 | 4 | Did not take test | 2 | Did not take test | 5 | Did not take test |
| 4 | 8 | Did not take test | 4 | Did not take test | 9 | Did not take test |
| 5 | 10 | 9 | 5 | 5 | 8 | 8 |
| 6 | 3 | 7 | 4 | 2 | 4 | 4 |
| 7 | 3 | 3 | 1 | 1 | Leave blank | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 2 | Did not take test | 2 | Did not take test | 6 | Did not take test |
| 9 | 15 | Did not take test | 22 | Did not take test | 29 | Did not take test |
| 10 | Did not take test | 11 | Did not take test | 4 | Did not take test | 24 |
| 11 | Leave blank | Did not take test | 1 | Did not take test | Leave blank | Did not take test |

In the following section, a more detailed look at the responses from the participants will be taken. Tables 2.2 to 2.4 identifies how many student were able to correctly receive fingerspelling and/or numbering items from the three videos viewed in the pre and post-tests.

Table 2.2 deals specifically with data collected from the "Boat Accident" video. Several fingerspelling or number signs that were repeated throughout the video were correctly received some of the time, all of the time, or none of the time in both the pre- and post-tests. During analysis, attention was given to five fingerspelled or numbered signs, some of which were repeated in the video. These six items, which were not identified by the students in both the pre-test and post-test, included #SAFEWAY, #ALL, #DO (third instance of the word), as well as the numbers 3, five (of us) and two (daughters) (second instance of this word on Table 2.2). When looking at the fingerspelling or number signs ½ (hour) (second instance of this word on Table 2.2), two (of us), and #DO (second instance of the word list on Table 2.2), the participants correctly received them only during the post-test but missed them in the pre-test. In addition, #SUSAN and four (of us) were correctly received only once in the pre-test but missed by all in the post-test. The word #HAIL was fingerspelled twice in the video.

While many were able to catch it the first time, it appeared only one student was successfully able to recognize it both times in the pre and post-tests.

In the pre-test, eight students successfully recognized the fingerspelled word #DOCK but only five recognized it in the post-test. Out of all the fingerspelling and numbers included in this video, there were only seven items that held a consistent score for both the pre and post-tests, these were ½ (hour) (first occurrence of this number on Table 2.2), #SMDI, # LAURIE, #HAIL (second occurrence of this word on Table 2.2), —4 – 5 (times), and #WEATHER. Four students were able to correctly receive the number signs 1st, 2nd, 3rd, 4th and #BACK on the pre-test but only half were successful in identifying them again on the post-test. There were also other words that had been successfully identified in the pre-test but not identified in the post-test thus decreasing the scores by one or two points. The six items—one (week), ½ (hour), two (daughters), two (of us), #DO (first instance of this word on Table 2.2) and #DO (second occurrence of this word on Table 2.2)—increased by one score in the post-tests. Out of all the participants, four students thought they saw the number sign "5th"in the pre-test but in fact it was not in the video at all.

**Table 2.2 Number of right answers for each fingerspelling or numbering from "Boat Accident" video**

| Date/Time | Pre-test | Post-test | Quantities | Pre-test | Post-test |
|---|---|---|---|---|---|
| One (week) | 3 | 2 | Two (daughters) | 1 | 2 |
| 1/2 (hour) | 2 | 2 | Three | 0 | 0 |
| One (week) | 2 | 3 | Two (of us) | 0 | 1 |
| One (hour) | 2 | 2 | Four (of us) | 1 | 0 |
| 1/2 (hour) | 0 | 1 | Five (of us) | 0 | 0 |
| | | | Two (daughters) | 0 | 0 |
| | | | 4-5 (times) | 3 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| | | | 1st | 4 | 2 |
| | | | 2nd | 4 | 2 |
| | | | 3rd | 4 | 2 |
| | | | 4th | 4 | 2 |
| | | | 5th (addition) | 4 | 0 |

| Place/NAME | Pre-test | Post-test | Lexicalized | Pre-test | Post-test |
|---|---|---|---|---|---|
| #SMDI | 2 | 2 | #DO | 1 | 2 |
| #KENORA | 4 | 3 | #HAIL | 5 | 4 |
| #DOCK | 8 | 5 | #HAIL | 1 | 1 |
| #SAFEWAY | 0 | 0 | #DO | 0 | 1 |
| #LAURIE | 1 | 1 | #ALL | 0 | 0 |
| #DANA | 5 | 3 | #BACK | 4 | 2 |
| #SUSAN | 1 | 0 | #WEATHER | 1 | 1 |
| | | | #DO | 0 | 0 |

The next section will summarize the data collected on Table 2.3 from the "Bad Luck" video.

Upon review of the data, it appears the students were able to identify much of the fingerspelling or number signs from this video in the pre-test but were not as successful in the post-test with a decrease often of one to four points. The greatest decrease seemed to have occurred with the fingerspelling or number signs 14 (age), three (stitches) and both occurrences of the word #LUCK.

As the review of data continued, it was noticed that the numbers 19 (age) (second occurrence in Table 2.3), 1st, two (of us) (both occasions on table 2.3), #CUT (second instance in Table 2.3), and all three instances of #AT were not recognized during either the pre or post-test. In addition, #JULY 18 (second to fifth occurrence in Table 2.3), 13 (age) (third instance in Table 2.3), two (of us) (first occurrence in Table 2.3), all three occasions of #COTTAGE, and #CUT (first instance in Table 2.3) had all been identified

correctly in the pre-test but missed in the post-test. As well, the word #SAND was the only word to have a one point increase from the pre-test to the post-test.

Upon further analysis, three items, some with multiple occurrences, were the only items to maintain their score from the pre-test to the post-test. They were #JULY 18 (first occurrence from Table 2.3), all three occurrences of 18 (age), as well as 14 (age) (second instance from Table 2.3).

**Table 2.3 Number of right answers for each fingerspelling and numbering from "Bad Luck" video**

| Date | Pre-test | Post-test | Age | Pre-test | Post-test | Quantities | Pre-test | Post-test |
|---|---|---|---|---|---|---|---|---|
| #JULY 18 | 2 | 2 | 13 | 2 | 1 | 1st | 0 | 0 |
| #JULY 18 | 2 | 1 | 18 | 3 | 3 | Two (of us) | 1 | 0 |
| #JULY 18 | 2 | 1 | 13 | 3 | 2 | Three (stitches) | 5 | 3 |
| #JULY 18 | 2 | 1 | 13 | 1 | 0 | Two (of us) | 0 | 0 |
| #JULY 18 | 1 | 0 | 14 | 6 | 2 | Two (of us) | 0 | 0 |
| | | | 14 | 2 | 2 | | | |
| | | | 15 | 2 | 1 | | | |
| | | | 16 | 3 | 2 | | | |
| | | | 17 | 3 | 2 | | | |
| | | | 18 | 3 | 3 | | | |
| | | | 18 | 2 | 2 | | | |
| | | | 19 | 3 | 2 | | | |
| | | | 19 | 0 | 0 | | | |

| Place | Pre-test | Post-test | Lexicalized | Pre-test | Post-test |
|---|---|---|---|---|---|
| #COTTAGE | 1 | 0 | #LUCK | 8 | 5 |
| #COTTAGE | 1 | 0 | #AT | 0 | 0 |
| #COTTAGE | 1 | 0 | #BLOOD | 3 | 2 |
| | | | #CUT | 3 | 0 |
| | | | #AT | 0 | 0 |
| | | | #SAND | 2 | 3 |
| | | | #CUT | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| | | | #AT | 0 | 0 |
| | | | #LUCK | 5 | 2 |

Finally a summary of Table 2.4 was compiled representing the scores of the pre-test and post-test for the "Photography" video. The participants successfully identified the four fingerspelled and numbered signs #PRAIRIE, #VIEW, #NO (first instance from Table 2.4), and #SO (first instance from Table 2.4) during the pre-test but were unable to recognize them again during the post-test. A small number of students were also able to recognize the word 1st (time), #GRANT (third occurrence from Table 2.4) and #SO (second occurrence from Table 2.4), but only during the post-test. In addition, none of the participants were able to recognize the fingerspelled word #NO in its second or third occurrence. The only four fingerspelled words or numbers to maintain the same score for both the pre and post-tests were: three (hours) (second instance from Table 2.4), 9:00 pm, eight (Deaf students) and #WAY. Finally, there were many items that dropped one to two points between the pre and post-test, but there were only three words, two (Deaf students) and ten (Deaf students) (second and third instance in Table 2.4), that dropped by three to four points. Six words increased between one or two points from the pre-test to the post-test.

**Table 2.4 Number of right answers for each fingerspelling and numbering from "Photography" video**

| Date | Pre-test | Post-test | Quantities | Pre-test | Post-test |
|---|---|---|---|---|---|
| Five (years ago) | 6 | 5 | Two (Deaf students) | 7 | 3 |
| Five (years later) | 3 | 5 | Three (Deaf students) | 4 | 3 |
| Eight (weeks) | 4 | 6 | Four (Deaf students) | 3 | 4 |
| Three (hours) | 5 | 3 | Five (Deaf students) | 5 | 3 |
| Three (hours) | 4 | 3 | Ten (Deaf students) | 7 | 4 |
| Eight (weeks) | 4 | 3 | Ten (Deaf students) | 6 | 2 |
| Eight (weeks) | 4 | 2 | Eight (Deaf students) | 4 | 4 |
| Three (hours) | 3 | 3 | Two (Deaf students) | 4 | 3 |
| 6:00 PM | 3 | 2 | Ten (Deaf students) | 4 | 3 |
| 9:00 PM | 3 | 3 | 1st (time) | 0 | 1 |
| 10:00 PM | 3 | 2 | Two (interpreters) | 4 | 3 |
| Three (hours) | 3 | 1 | | | |
| Eight (weeks) | 3 | 2 | | | |

| Place/Name | Pre-test | Post-test | Lexicalized | Pre-test | Post-test | Money | Pre-test | Post-test |
|---|---|---|---|---|---|---|---|---|
| #PRAIRIE | 1 | 0 | #OK | 2 | 1 | $265 | 1 | 0 |
| #VIEW | 1 | 0 | #NO | 1 | 0 | | | |
| | | | #NO | 0 | 0 | | | |
| | | | #NO | 0 | 0 | | | |
| | | | #WAY | 2 | 2 | | | |
| | | | #GRANT | 1 | 3 | | | |
| | | | #GRANT | 1 | 2 | | | |
| | | | #SO | 1 | 0 | | | |
| | | | #GRANT | 0 | 2 | | | |
| | | | #SO | 0 | 1 | | | |

**Receptive skills analysis of five participants**

This section of analysis will deal specifically with the receptive skills of the five participants who took part in both the pre-test and post-test of my research. A review of their scores will be discussed and Table 3.1 to 3.3, which has been added following the analysis, has all the data arranged for review.

Table 3.1 represents the fingerspelled and numbered items found in the "Boat Accident" video along with the pre- and post-test scores of the five students. I will discuss what was identified correctly, incorrectly, or missed.

Through the data collection process it was identified that the scores of seventeen words remained unchanged for both tests while twelve other words had an increase of one or two occurrences. In addition, the students were unable to recognize eight items which included: three, four (of us), five (of us), two daughters (second occurrence of the word on Table 3.1), #SAFEWAY, #SUSAN, #ALL and #DO (third occurrence of the word on Table 3.1). As well, two of the five participants incorrectly thought they saw the number sign "5$^{th}$" during the pre-test and only the word #BACK decreased by one point from the pre-test to the post-test.

**Table 3.1 Number of right answers for fingerspelling or numbering from "Boat Accident" video by five students who did both tests**

| Date/Time | Pre-test | Post-test | Quantities | Pre-test | Post-test |
|---|---|---|---|---|---|
| One (week) | 2 | 2 | Two (daughters) | 1 | 2 |
| 1/2 (hour) | 1 | 2 | Two (of us) | 0 | 1 |
| One (week) | 1 | 3 | Three | 0 | 0 |
| One (hour) | 1 | 2 | Four (of us) | 0 | 0 |
| 1/2 (hour) | 0 | 1 | Five (of us) | 0 | 0 |
| | | | Two (daughters) | 0 | 0 |
| | | | 4-5 (times) | 1 | 3 |
| | | | 1$^{st}$ | 2 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | | | 2nd | 2 | 2 |
| | | | 3rd | 2 | 2 |
| | | | 4th | 2 | 2 |
| | | | 5th (addition) | 2 | 0 |

| Place/Name | Pre-test | Post-test | Lexicalized | Pre-test | Post-test |
|---|---|---|---|---|---|
| #SMDI | 0 | 2 | #DO | 0 | 2 |
| #KENORA | 3 | 3 | #HAIL | 3 | 4 |
| #DOCK | 5 | 5 | #HAIL | 1 | 1 |
| #SAFEWAY | 0 | 0 | #DO | 0 | 1 |
| #LAURIE | 1 | 1 | #ALL | 0 | 0 |
| #DANA | 3 | 3 | #BACK | 3 | 2 |
| #SUSAN | 0 | 0 | #WEATHER | 0 | 1 |
| | | | #DO | 0 | 0 |

The next video, “Bad Luck”, is summarized in Table 3.2. The majority of items were interpreted in a consistent fashion from the pre-test to the post-test, except for 12 items that were missed in both the pre- and post-tests. The 12 items included: 19 (age) (second instance from Table 3.2), 1st, all three instances of two (of us), all three instances of #COTTAGE, the three occurrences of #AT, and #CUT (the second instance in Table 3.2). The four items that increase their score by one were #JULY 18 (first instance from Table 3.2), 18 (age) (first instance from Table 3.2), 19 (age) (first instance from Table 3.2), and #SAND. Finally, there were four items that decreased in score from the pre-test to the post-test; #CUT and #LUCK are among them. The first occasion of #CUT was correctly identified by two students, but was not identified by any of the participants in the post-test. As well, in the first occurrence of #LUCK all the participants correctly identified it in both the pre and post-tests while, in the second instance, it was only correctly identified by two participants in the post-test.

**Table 3.2 Number of right answers for fingerspelling or numbering from "Bad Luck" video by five students who did both tests**

| Date | Pre-test | Post-test | Age | Pre-test | Post-test | Quantities | Pre-test | Post-test |
|---|---|---|---|---|---|---|---|---|
| #JULY 18 | 1 | 2 | 13 | 1 | 1 | 1st | 0 | 0 |
| #JULY 18 | 1 | 1 | 18 | 1 | 2 | Two (of us) | 0 | 0 |
| #JULY 18 | 1 | 1 | 13 | 2 | 2 | Three (stitches) | 2 | 2 |
| #JULY 18 | 1 | 1 | 13 | 1 | 0 | Two (of us) | 0 | 0 |
| | | | 14 | 3 | 2 | Two (of us) | 0 | 0 |
| | | | 14 | 2 | 2 | | | |
| | | | 15 | 1 | 1 | | | |
| | | | 16 | 1 | 1 | | | |
| | | | 17 | 2 | 2 | | | |
| | | | 18 | 2 | 2 | | | |
| | | | 18 | 2 | 2 | | | |
| | | | 19 | 1 | 2 | | | |
| | | | 19 | 0 | 0 | | | |

| Place | Pre-test | Post-test | Lexicalized | Pre-test | Post-test |
|---|---|---|---|---|---|
| #COTTAGE | 0 | 0 | #LUCK | 5 | 5 |
| #COTTAGE | 0 | 0 | #AT | 0 | 0 |
| #COTTAGE | 0 | 0 | #BLOOD | 2 | 2 |
| | | | #CUT | 2 | 0 |
| | | | #AT | 0 | 0 |
| | | | #SAND | 1 | 2 |
| | | | #CUT | 0 | 0 |
| | | | #AT | 0 | 0 |
| | | | #LUCK | 4 | 2 |

The final video, “Photography”, is summarized in Table 3.3 and is discussed in this section. The five participants who took both tests increased their combined correct responses by eleven from the pre to the post-test but it was noted that their combined responses to nine other items on the word list decreased by one or two points. Twelve

items from the video maintained the same score between tests. In addition, four words #PRAIRIE, #VIEW and two occurrences of #NO (second and third instances from Table 3.3), were not identified in either the pre-test or post-test by any of the students. The first occurrences of the words #NO and #SO were identified in the pre-test but were not in the post-test. It was also noticed that there were items not identified in the pre-test that were in the post-test. These included: 1st time, the three occurrences of #GRANT, as well as the second occurrence of #SO.

**Table 3.3 Number of right answers for fingerspelling or numbering from "Photography" video by the five students who did both tests**

| Date | Pre-test | Post-test | Quantities | Pre-test | Post-test |
|---|---|---|---|---|---|
| Five (years ago) | 3 | 4 | Two (Deaf students) | 4 | 2 |
| Five (years later) | 2 | 4 | Three (Deaf students) | 1 | 2 |
| Eight (weeks) | 3 | 5 | Four (Deaf students) | 1 | 3 |
| Three (hours) | 2 | 2 | Five (Deaf students) | 2 | 2 |
| Three (hours) | 2 | 2 | Ten (Deaf students) | 3 | 3 |
| Eight (weeks) | 2 | 2 | Ten (Deaf students) | 3 | 3 |
| Eight (weeks) | 2 | 1 | Eight (Deaf students) | 3 | 3 |
| Three (hours) | 2 | 2 | Two (Deaf students) | 3 | 1 |
| 6:00 PM | 2 | 2 | Ten (Deaf students) | 2 | 3 |
| 9:00 PM | 2 | 2 | 1st (time) | 0 | 1 |
| 10:00 PM | 2 | 1 | Two (interpreters) | 3 | 2 |
| Three (hours) | 2 | 1 | | | |
| Eight (weeks) | 2 | 1 | | | |

| Place/NAME | Pre-test | Post-test | Lexicalized | Pre-test | Post-test | Money | Pre-test | Post-test |
|---|---|---|---|---|---|---|---|---|
| #PRAIRIE | 0 | 0 | #OK | 1 | 1 | $265 | 0 | 0 |
| #VIEW | 0 | 0 | #NO | 1 | 0 | | | |
| | | | #NO | 0 | 0 | | | |
| | | | #NO | 0 | 0 | | | |
| | | | #WAY | 1 | 1 | | | |
| | | | #GRANT | 0 | 2 | | | |
| | | | #GRANT | 0 | 1 | | | |
| | | | #SO | 1 | 0 | | | |
| | | | #GRANT | 0 | 1 | | | |
| | | | #SO | 0 | 1 | | | |

**Analysis of fingerspelling and numbering rules for all participants**

This section of the paper will focus on the second section of the pre-test and post-test, the fingerspelling and numbering rules. The students were asked to answer 10 questions regarding fingerspelling and numbering rules in order to test their knowledge and understanding. Regardless of whether or not they took part in only one test or both, the second section of the pre-test and post-test from all the participants was analyzed. Results can be found in Tables 4.1 – 4.4.

Table 4.1 deals with the responses given for questions 1, 2, and 3 of the general fingerspelling rules portion of the test. In the pre-test, all but one student were able to explain the correct hand position rules for fingerspelling. During the post-test only two students were unable to answer this question. Interestingly, one of the two who answered this question incorrectly in the post-test, had answered it correctly in the pre-test. In addition, one student noted that she/he was only able to answer questions 1 and 4 in this section of the pre-test, as she/he did not have enough time remaining.

The second question asked the students to explain one or two general receptive rules of fingerspelling. All of the participants were able to identify rules in the pre-test,

but again as in question one, a student who had answered correctly in the pre-test was unable to do so again in the post-test.

The third question asked the students to identify three main strategies for understanding fingerspelling. In the pre-test the majority of the students were able to give one or two strategies for understanding fingerspelling as well as offer some examples for each strategy, but only two students were able to give three strategies with several examples. Only two students were not able to explain the strategy or offer examples in the pre-test. For the post-test responses, two students incorrectly explained the strategies and gave incorrect examples, while one other student was unable to explain any strategies or give examples in the post-test, although, she/he had explained two strategies and had given examples in the pre-test. One other participant did not offer any strategies but did add one example.

**4.1 Comparison of the answer from pre-test and post-test question #1 to question #3**

| | Question #1 Correct Hand Position | | Question #2 General Receptive Rules | | Question #3 Three Main Strategies for Understanding Fingerspelling | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| #1 | Don’t know | Don't know | Right | Right | Only have two strategies (configuration and closure) | Don't know |
| #2 | Right | Don't know | Right | Don't know | Don’t know | Wrong |
| #3 | Right | Didn’t take test | Right | Didn’t take test | Don’t know | Didn’t take test |
| #4 | Right | Didn’t take test | Right | Didn’t take test | Only have one strategy (context) | Didn’t take test |
| #5 | Right | Right | Right | Right | Right | Right |

| | | | | | | |
|---|---|---|---|---|---|---|
| #6 | Right | Right | Right | Right | Only have one strategy (context) | Wrong |
| #7 | Right | Right | Right | Right | Right | Right |
| #8 | Right | Didn't take test | Not enough time to answer… Sorry!! | Didn't take test | Not enough time to answer… Sorry!! | Didn't take test |
| #9 | Right | Didn't take test | Right | Didn't take test | Only have two strategies (configuration and closure) | Didn't take test |
| #10 | Didn't take test | Right | Didn't take test | Right | Didn't take test | No strategy but only have one example |
| #11 | Right | Didn't take test | Right | Didn't take test | Only have one strategy (configuration) | Didn't take test |

The responses given to questions 4, 5 and 6 with regard to fingerspelling rules are reviewed in this section. The results can be found in Table 4.2. In the pre-test all of the students knew the rule regarding where to look when reading fingerspelling. In the post-test, all but two who had answered correctly in the pre-test, were able to give the right answer again.

Question 5 asked the participants for another name for a "loan sign". The correct response to this is "lexicalized". They were also required to explain the rules for the use of loan signs. Only one student was able to identify another name for a loan sign and explain one of the rules related to loan signs in the pre-test. Two other students were unable to answer the question at all, while one student incorrectly identified an alternate name for loan signs but was able to correctly explain one rule during the pre-test only.

Two students gave incorrect answers in the pre-test, while two other students were unable to answer the question in the post-test.

An explanation of when to use fingerspelling was the next question to be asked and all of the students explained anywhere from one to several rules. Again as had happened with other questions, one student who knew the correct answer in the pre-test did not know that answer in the post-test.

**4.2 Comparison of the answers from pre-test and post-test question #4 to question #6**

| | Question #4 Where to Look When Reading Fingerspelling | | Question #5 Other Name for Loan Sign and explain | | Question #6 When to use Fingerspelling | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| #1 | Right | Right | Don't know | Right | Right | Right |
| #2 | Right | Don't know | Wrong | Don't know | Right | Don't know |
| #3 | Right | Didn't take test | Don't know | Didn't take test | Right | Didn't take test |
| #4 | Right | Didn't take test | Right | Didn't take test | Right | Didn't take test |
| #5 | Right | Wrong | Another name is wrong but did explain the rule | Right | Right | Right |
| #6 | Right | Right | Wrong | Right | Right | Right |
| #7 | Right | Right | Don't know the another name but did explain the rule | Right | Right | Right |
| #8 | Right | Didn't take test | Not enough time to answer… Sorry!! | Didn't take test | Not enough time to answer… Sorry!! | Didn't take test |
| #9 | Right | | Don't know | | Right | |
| #10 | Didn't take test | Right | Didn't take test | Right | Didn't take test | Right |

| | | | | | | |
|---|---|---|---|---|---|---|
| #11 | Wrong | Didn't take test | Don't know the another name but did explain the rule | Didn't take test | Right | Didn't take test |

Numbering rules related to questions 7, 8, and 9 will be discussed in this section using the results from Table 4.3.

Almost half of the students knew the rule for the cardinal numbers for question 7, while the other half of the participants did not know the rule or gave incorrect rules. One participant knew the cardinal number rule during the pre-test but not during the post-test. In question 8, less than half of the students were able to explain the rule for four-digit numbers in the pre-test, however, in the post-test four students were able to explain the rule and two students were not. The opposite occurred when two other students were able to explain the rule in the pre-test but not the post-test. One other student was able to explain the rule in the post-test but not the pre-test.

Question 9 asked the students to either explain the rule of signing dates for a day, week or month. In the pre-test only two students were able to explain the rules for signing all three dates, the other students were unable to offer an answer. For the post-test, one of the students who had correctly explained all 3 rules in the pre-test, was able to do so again in the post-test. The other three students were able to explain only one date rule in the post-test. Two students who took part in the pre- and post-tests either gave a wrong answers or did not know the rules in both tests.

**4.3 Comparison of the answers from pre-test and post-test question #7 to question #9**

| | Question #7 Rule for Cardinal Numbers | | Question #8 Rules for Four Digits | | Question #9 Rules for Dates | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| #1 | Right | Right | Don't know | Right | Right (day, week and month) | Right (day, week and month) |
| #2 | Wrong | Wrong | Don't know | Don't know | Don't know | Don't know |
| #3 | Don't know | Didn't take test | Don't know | Didn't take test | Don't know | Didn't take test |
| #4 | Right | Didn't take test | Don't know | Didn't take test | Right (day, week and month) | Didn't take test |
| #5 | Right | Wrong | Right | Right | Wrong | Wrong |
| #6 | Don't know | Right | Right | Right | Don't know | Right (month) |
| #7 | Right | Right | Right | Don't know | Don't know | Right (month) |
| #8 | Not enough time to answer… Sorry!! | Didn't take test | Not enough time to answer… Sorry!! | Didn't take test | Not enough time to answer… Sorry!! | Didn't take test |
| #9 | Right | Didn't take test | Don't know | Didn't take test | Don't know | Didn't take test |
| #10 | Didn't take test | Don't know | Didn't take test | Right | Didn't take test | Right (month) |
| #11 | Don't know | Didn't take test | Right | Didn't take test | Don't know | Didn't take test |

The last question in the test dealt with the rules for sports. Three students in the pre-test did not know the rules related to sports, however, five students did. As well, in the pre-test, one student offered an incorrect rule for sports. In the post-test, half of the students were able to explain the rules, while the other half of the participants either did

not know the rules, forgot them, or answered incorrectly. Only two students were able to explain the sport rules correctly in both the pre- and post-tests.

**4.4 Comparison of the answers from pre-test and post-test question #10**

| | Question #10 Rules for Sport | |
|---|---|---|
| Student | Pre-test | Post-test |
| #1 | Right | Forgot |
| #2 | Wrong | Don't know |
| #3 | Don't know | Didn't take test |
| #4 | Right | Didn't take test |
| #5 | Right | Right |
| #6 | Don't know | Right |
| #7 | Right | Right |
| #8 | Not enough time to answer… Sorry!! | Didn't take test |
| #9 | Right | Didn't take test |
| #10 | Didn't take test | Wrong |
| #11 | Don't know | Didn't take test |

**Analysis of fingerspelling and numbering rules for five participants**

This section of the analysis will focus specifically on the fingerspelling and numbering rules portion of the test and will examine the changes, if any, of the five students who took part in both tests of my research. All the data reviewed in this section can be found on Tables 4.5 to 4.8. Studying and comparing the responses to each question helped to focus the analysis. By doing so, the participants' knowledge of the rules and also notice if there were a substantial increase in knowledge from the pre-test to post-test were identified.

The individual identified in the data below as student #1did relatively well on both tests, with the exception of a few questions that she/he was unable to answer, including question #1 on both tests. For question #3 she/he was able to name two strategies on the pre-test, but unable to give any strategies during the post-test (see Table

4.5). For questions #5 (see Table 4.6) and #8 (see Table 4.7), student #1 responded with "don't know" in the pre-test, but was able to correctly answer these same questions in the post-test. The last question was answered correctly in the pre-test, but was not correctly recalled the answer during the post-test.

Student #2, whose data is represented through Tables 4.5 to 4.8, did rather poorly in both the pre-test and post-test. She/he correctly answered four questions in the pre-test and, in the post-test, incorrectly answered questions 3 and 7 and responded with "don't know" to the remaining questions in the post-test.

Student #5 answered the majority of the questions correctly in the pre-test with the exception of question #9 (see Table 4.7) and question #5 (see Table 4.6), to which they were able to explain the rule with one example but were unable to offer the appropriate term. Although she/he was not as successful in the post-test as in the pre-test, student #5 continued to do relatively well. Questions # 4 (see Table 4.5) and #7 (see Table 4.7) were correctly answered in the pre-test, but answered incorrectly in the post-test and their responded to question # 9 incorrectly in both instances.

An improvement in student #6's responses from the pre-test to the post-test was noted. In the pre-test she/he incorrectly answered one question and responded with "don't know" to three other questions. In the post-test, she/he answered all but question #3 correctly (see Table 4.5) , and here she/he gave one correct strategy on the pre-test, but answered incorrectly in the post-test.

Finally student # 7, whose data can be found in Tables 4.5 through 4.8, did extremely well on both tests. In the pre-test, the participant was able to offer an example for question #3 but not another term, and for question #9, did not know the answer. For

the post-test, student #7 correctly answered all the questions with the exception of question #8, where she/he responded with “don’t know”.

**4.5 Comparison of the answers from the pre-test and post-test question #1 to question #3 by only five students**

| | Question #1 Correct Hand Position | | Question #2 General Receptive Rules | | Question #3 Three Main Strategies for Understanding Fingerspelling | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| #1 | Don’t know | Don't know | Right | Right | Only have two strategies (configuration and closure) | Don't know |
| #2 | Right | Don't know | Right | Don't know | Don’t know | Wrong |
| #5 | Right | Right | Right | Right | Right | Right |
| #6 | Right | Right | Right | Right | Only have one strategy (context) | Wrong |
| #7 | Right | Right | Right | Right | Right | Right |

**4.6 Comparison of the answers from the pre-test and post-test question #4 to question #6 by only five students**

| | Question #4 Where to Look When Reading Fingerspelling | | Question #5 Other Name for Loan Sign and Explain | | Question #6 When to use Fingerspelling | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| #1 | Right | Right | Don’t know | Right | Right | Right |
| #2 | Right | Don't know | Wrong | Don't know | Right | Don't know |
| #5 | Right | Wrong | Another name is wrong but did explain the rule | Right | Right | Right |

| | | | | | | |
|---|---|---|---|---|---|---|
| #6 | Right | Right | Wrong | Right | Right | Right |
| #7 | Right | Right | Don't know another name but did explain the rule | Right | Right | Right |

**4.7 Comparison of the answers from the pre-test and post-test question #7 to question #9 by only five students**

| | Question #7 Rule for Cardinal Numbers | | Question #8 Rules for Four Digits | | Question #9 Rules for Dates | |
|---|---|---|---|---|---|---|
| Student | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test |
| #1 | Right | Right | Don’t know | Right | Right (day, week and month) | Right (day, week and month) |
| #2 | Wrong | Wrong | Don’t know | Don't know | Don’t know | Don't know |
| #5 | Right | Wrong | Right | Right | Wrong | Wrong |
| #6 | Don’t know | Right | Right | Right | Don’t know | Right (month) |
| #7 | Right | Right | Right | Don't know | Don’t know | Right (month) |

**4.8 Comparison of the answers from the pre-test and post-test question #10 by only five students**

| | Question #10 Rules for Sport | |
|---|---|---|
| Student | Pre-test | Post-test |
| #1 | Right | Forget |
| #2 | Wrong | Don't know |
| #5 | Right | Right |
| #6 | Don’t know | Right |
| #7 | Right | Right |

Through the analysis and comparison of the pre-test and post-test results from the beginning of a semester to the end of the same semester, it seems a noticeable improvement could not be seen. Moreover, when reviewing the receptive skills data, in comparing the scores of the program that offered a separate fingerspelling and numbering course with the program that only offered ASL courses, no palpable difference in scores could be found. However, when evaluating the data from the fingerspelling and numbering rules portion of the test, a small improvement with specific fingerspelling and numbering rules such as those that deal with sports or dates, was noted. Further analysis and discussion of these findings will continue in the next chapter.

**Instructor Interviews**

The interview portion of this research was conducted with a total of five participants who teach in three Canadian Deaf Studies Programs and American Sign Language – English Interpretation Programs. The interviews included a summary of the instructors' backgrounds and teaching experience, as well as identifying whether their first language was ASL or an oral method of communication. Most of the instructors grew up using ASL in their homes with their families, while a few instructors used either spoken English or gestures and fingerspelling to communicate. All five of these full-time instructors had earned either a bachelor's or master's degree and all had been teaching ASL for 20 years or more. The instructors teach between two to four courses in either a Deaf Studies Program or an American Sign Language – English Interpretation Program.

The data from the interviews is summarized below according to each interview question regarding the teaching of fingerspelling and numbering.

***Interview question 1: What kind of materials (papers, textbook, video, etc) do you use for students to practice fingerspelling and numbering skills?***

The data collected showed that a variety of materials were used to assist the students in practicing their fingerspelling and numbering skills. Most of the instructors did not have formal materials for the students to use to practice their fingerspelling and numbering either in the classroom or in the lab, but typically used material from their curriculum or created materials from "scratch". These materials are listed below.

- Word list (hand out)
- Partner or group fingerspelling or numbering practice
- Activities for students to practice (i.e similar to telephone game, relay game, bingo, buy furniture activity, itinerary activity, flash cards-one word on each card that does not have a sign, copy fingerspelling from instructors' fingerspelling, and others)
- Using workbook:
    - *Signing Naturally Level 1 – 3 Workbook* (Smith, C., Lentz, E. M., and Mikos, K. 1988, 1992, & 2001)
    - *Fingerspelling Word Recognition Through Rapid Serial Visual Presentations* (Patrie, C. & Johnson, R., 2011)
    - *Number Signs for everyone: Numbering in American Sign Language* (MacDougall, C., 2004)
    - *ABC 1-2-3 Fingerspelling and Numbers in ASL* (Mendoza, 2006)
    - *Fingerspelling 1 Student video* (Keast,1998)
    - *Fingerspelling in American Sign Language* (Cartwright & Bahleda, 2007)

- *Numbering in American Sign Language* (Cartwright & Bahleda, 2007)

***Interview question 2: What kind of tools do you use for students to practice their fingerspelling and numbering skills?***

Upon completion of the interviews, the responses were analyzed to see if any similarities or significant differences could be found. Many different educational tools were recommend by all the instructors to allow the students more practice with their fingerspelling and numbering skills. The many suggestions from all the instructors have been categorized into four general sections. These sections include: lexicalized signs, fingerspelling and numbering rules, receptive and expressive skills, and activities.

***For lexicalized signs:***

- Encourage students to practice lexicalized words by using flash cards or word lists.
- Encourage students to practice their receptive skills with these lexicalized word lists by first receiving the word and then spelling it back to ensure they understood the speaker's fingerspelling.
- Discuss lexicalization and its unique handshape and movement of the words. Be sure to fingerspell a word that does not have a sign.

***For fingerspelling and numbering rules:***

- Discuss the rules of fingerspelling and numbering.
- Encourage students to use the appropriate hand placement in relation to their bodies when fingerspelling. They need be aware that their hand should be

between their chin and shoulder, and that they need to also remember to be relaxed. They should not be fingerspelling with a stiff hand or a stiff body.

- The students should not look at their hand while they fingerspell but rather maintain eye contact with the other signer.
- When receiving fingerspelling, students should maintain eye contact with the signer as opposed to focusing on her/his hand.
- There are some very basic tools for fingerspelling and numbering that must be taught and without a course like this, they will never be able to do so.
- By knowing the topic of discussion, the student should begin to think of a list of words related to this topic that might come up in the discussion. Also, they should be considering the context of the discussion as well.

***Receptive and Expressive skills:***

- It is important to recognize the handshape, movements and styles of fingerspelled words and to look for the shape of the whole word as opposed to focusing on individual letters of the word. Receptive skills can be learned by watching videos of Deaf people signing or by students watching their instructor's signing. These tools will help the students to not only remember them but also teach them how to apply this learning to their own fingerspelling and numbering production.
- Encourage students to identify fingerspelled words used by Deaf people in the videos they watch and then discuss the meaning of the words.

- Encourage the students to express their expressive message in ASL rather than defaulting to English fingerspelled words. Avoid focusing on students' first language by having them use ASL.
- When in a large, formal setting such as a presentation, the students are required to fingerspell very clearly and slowly to ensure that those audience members who are seated in the back of the room will be able to see the fingerspelled words as well. This is in contrast to casual conversations where fingerspelling can use and including unique movements and handshapes.
- The style of fingerspelling used by Deaf individuals varies a great deal; sometimes it will be clear while other times not clear. Some Deaf people like to fingerspell very clearly while others will fingerspell using unique movements. Keep in their mind that Deaf people might in fact fingerspell a word while not following fingerspelling rules, therefore, students should not expect every instance of fingerspelling to be perfect or correct.

***Activities:***

- Relay activity: Divide the students into two groups and ask them to form 2 lines. The lab instructor will fingerspell a word to the students at the front of the line. Once they identify the word, they must run to the board to write the word down. The first student to successfully writes the correct word will get the point.
- Another relay activity: The students will be put into groups of 2. They will be seated across from each other forming two rows. The one row will have their backs to the instructor while the other row will be facing both the row

with their teammate as well as the instructor who is standing at the front of the class. The instructor will then fingerspell a word to the row facing them. The students will then attempt to fingerspell the word they saw. The row with their backs to the instructor will then turn around to spell back the word their teammate gave them thus testing everyone's receptive and expressive skills.

***Interview question 3: What have you noticed about DSP students' receptive skills with fingerspelling and numbering? Have you noticed that DSP students struggle in this area? Explain/describe what kind of struggles they have? Give me some examples.***

The instructors were asked what they had noticed with regards to the DSP students' receptive skills. Many mentioned that the students' struggles could be broken down into two areas, fingerspelling and numbering. Several examples of struggles the students faced were discussed. The comments made by the instructors are summarized below.

***Fingerspelling***

During the interviews, it became apparent that the instructors felt DSP students are not ready to practice their receptive skills at the beginning of the semester, as they do not have enough skills. For this reason, most of instructors start the semester with slow and clear fingerspelling and will not fingerspell at their natural signing rate of speed but will increase their rate of speed in time when the students become more comfortable receptively. Sometimes the instructors will go back to a slower fingerspelling and signing rate depending on the complexity of the language being used and the discussion. As the semester continues, the students' receptive skills improve but they still have much

to learn. They need more time to become familiar and comfortable with receptive fingerspelling. Also, they need to see how Deaf people on a daily basis use fingerspelling. In addition, they will need to begin with short words (lexicalized) and build from there to become comfortable with receptive fingerspelling. This will require about two to three years of daily practice. One instructor noted, "they often need to fingerspell items two, three or even four times before the students catch the word." Fingerspelling a word once and having the students catch it is something that had yet to happen in their class. Sometimes even a very simple fingerspelled word like #YES was missed by the students. In some instances, the students were able to catch a long fingerspelled word from the instructor but not a simple word. Although no reason was offered during the interview, it is possible that the successfully identified words were connected to the participants' prior knowledge or experience. This could include words that instructors added to PowerPoint presentations or had previously discussed and practiced in class, thus assisting the students to make a link with the fingerspelling on the tests.

Another common thread throughout the interviews was that of the DSP students' need to depend on individual letters within a fingerspelled word as opposed to looking at the word as a whole. For example, when an instructor fingerspelled #FOX, the students wanted to focus on each letter as opposed to the handshape and movement. Instructors have to remind the students to look at the whole word by focusing on the handshape and movement and not each letter. The students struggle when receptively receiving a fingerspelled word, which in turn makes it more challenging to identify in order to ultimately translate it to English: "The students have grown up depending on the sounds

of language as opposed to the visual structure of ASL and so are not used to watching for handshapes and movements". Another interesting comment was made in regards to the "need to pay more attention to mouth movement as opposed to hand movement when a Deaf person is fingerspelling. Students depend a great deal on mouth movement in order to identify a word. The best way to reduce this habit is for the Deaf person to not move their mouth when fingerspelling to thus force the student to look at the word itself". It was also noted that, "those students whose first language is not English or are older second language learners tend to struggle more with their receptive skills and are slow to catch fingerspelling compared to the younger learners whose first language is English". Moreover, "female students seem to have stronger receptive skills than male students. Interestingly as well, it seems that fingerspelled words from those who have larger hands are more easily understood as opposed to those with small hands". Although no reason was offered during the interview, from my teaching experience, I have noticed younger students are able to learn or pick up new things easier while older students struggle to remember new information or new signs and need some time to incorporate new information. Also, being Deaf myself, I the researcher find it difficult sometimes to read fingerspelling from small and fat hands or the small hands of children, meaning not only students struggle when receiving fingerspelling and numbering information. Information from small and fat hands can be likened to a thick marker on the paper, it is difficult to see individual letters.

Receptively, fingerspelling is very challenging for students. It is not enough to simply give them tools for receptive skills, as the skills are easily forgotten if not repeated and emphasized. It is thus necessary for the students to understand the importance of

catching the first and last letters of a fingerspelled word, to look for the shape of the letters, and its movement. Focusing on the configuration of the whole word is much more important than concentrating on each letter. The instructors emphasized that they must be sure to teach their students to fingerspell properly so that others will be able to understand their fingerspelling. They need to be taught how to fingerspell clearly and fluently to avoid bouncing while fingerspelling.

Many of the instructors noted that other factors might also affect the students' ability to comprehend a fingerspelled word. Such factors may include encountering uncommon fingerspelled words such as technical terminology, scientific terms or a new unique movement of fingerspelling. A student might find himself or herself in a situation where a Deaf individual is fingerspelling a word that is commonplace for that environment but very new to the student—putting them in a receptively challenging situation. An example given was that of a Deaf person discussing Ebola. This word and topic might be familiar to everyone except the student and so they will need to adopt the tools they have learned to assist them in identifying the word. Additionally, if instructors are fingerspelling a long word, the handshapes become more complex, therefore, potentially confusing the students as to how to form the word. The instructors also noted that some topics might pose a greater challenge than others including chemistry and other sciences.

Another instance of receptive challenges for the students may occur when a conversation turns to include an address, names of cities, and other common points of conversation. In these sorts of scenarios, the students need to consider the context of the discussion to assist them in determining the words being spelled. At times, they may

easily catch the make of a vehicle such as a Ford or Chev but may be at a loss when encountering the word for the car model, such as Impala, which, is not as commonly used. Similarly when street names or cities are fingerspelled, the students will find themselves struggling if it is not a place they are familiar with. Likewise, if introductions are being made and the name is unfamiliar to them, students will struggle and typically are unable to catch the name being presented. In these sorts of instances they struggle more as they cannot create a list of potential names, the options are simply too many.

A variety of fingerspelling styles exist, sometimes these styles will be clear while other times they will not. A signer may or may not fingerspell a word in its entirety, flip letters or spell a long and difficult word. No matter what the circumstance, an interpreter's role will be to figure out what the word is. Although students are taught the rules of fingerspelling, it is important to remind them that Deaf people sometimes will break the fingerspelling or numbering rules. Students need to be prepared for the challenges of receiving fingerspelling.

***Numbering***

Some instructors have noticed that the students struggle more with numbering than fingerspelling because with fingerspelling the students are used to receiving this sort of information and can rely on the context of the conversation to help identify the word but with numbers there is no context, just the number. Also, when the students watch a signer's fingerspelling, it is easy to recognize unique movements of words but for numbers they are required to simply memorize the numbers. For these reasons it seems that numbers are more challenging for the students. When signing an address, students are more receptively challenged because now they are faced with more than one item to

identify, items that include both numbers and fingerspelled words. If an instructor adds which city this address can be found, they could then look at that context to find any hints to help them to connect the context and fingerspelled word.

Instructors also noticed that students seem to struggle with or are confused by the American style of signing numbers. When incorporating American workbooks and companion videos with American signers, students quickly realize the difference in number signing styles between American and Canadian signers. One way to overcome this challenge is by having the students learn the American style of signing in addition to the Canadian style.

Another common struggle for students is with that of proper palm orientation when signing numbers. The students often struggle with proper palm orientation and rules when signing time, age, height, phone number, address, or amounts. They are unsure whether or not to have their palm orientations facing toward the signer or away. In addition, instructors noted that specific struggles with the number movements for 67, 68, 69, 98, 97, and 96 were common. This is not surprising because the rules for palm orientation are particularly challenging for double-digits involving “6” and “9”, due to the formation of these numbers with outside fingers (index and pinky).

Many instructors also added that they often found students struggle with rules related to sports scores, money, complex numbers, as well as unfamiliar names. When discussing a sporting event between two teams, the neutral space in front of the signer is used to establish the teams in question. The signer will spatially place one team close to their chest and the opposing team at roughly an arm’s length distance in from of them. The scores will be represented respectively in their assigned space. Additionally, the

score of the opposing team will be signed with the palm facing towards the signer with the use of their non-dominant hand while the score of the team closest to them will be signed with the palm facing outward with the use of their dominant hand. When considering money, there are a variety of acceptable ways to sign the same concept. For instance, when signing $1, an individual can choose to use the "1" sign and twist their wrist a number of times slightly or they can choose the sign "1" and the sign for "dollar". Both are acceptable and correct but the students must be aware of the options. In regards to complex number, such as perhaps 13,756, the students find themselves unable to identify the full number. It seems they struggle with identifying place values of each number being signed to them. In addition, it seems most students are weakest with the thousands number signs.

***Interview question 4: What is your opinion regarding separate fingerspelling and numbering courses from ASL courses as opposed to an ASL course that encompasses (include) everything?***

One of the instructors strongly believed that fingerspelling and numbering should not be offered as a separate course from ASL. She/he added that fingerspelling and numbering should be a component of the ASL courses in order to teach our language as a whole, true language as opposed to breaking it down into components of a language. Similarly, an individual being taught spoken English does not learn the language by having it broken down and taught compartmentally, they learn the language as a whole.

Another instructor thought that fingerspelling and numbering should be taught in lab class as a lesson in order to keep students focused on ASL structure while in ASL

class. Also, this instructor thought this would be too advanced for the DSP students but felt it would work well in the interpreter program.

A third perspective as mentioned by one of the instructors was that everything should be incorporated in their ASL course but if students needed more practice with receptive skills for fingerspelling or numbering, or if a more advanced level of fingerspelling was needed, then it should be taught separately from their ASL classes. The instructor added that if instructors do not need to incorporate fingerspelling lessons into their class, then "they [students] could focus solely on ASL structure and avoid the use of English. This would encourage them to depend less on English words or thinking about English words". It is important for them to focus on ASL. Another perspective suggests that fingerspelling does not represent English but rather is a part of ASL. For instance, new words or objects that did not exist in the past must be fingerspelled until a sign is created for them. Additionally, a word that has a sign may be fingerspelled instead to add emphasis to what is being discussed. Ultimately there are reasons behind the use of fingerspelling, which is why we have fingerspelling and numbering rules to ensure they are used correctly.

The other two instructors strongly believed a separate course should be offered because the students are in "Academics" and studying to become interpreters. They should know the rules of fingerspelling and numbering, which requires a great deal of practice. The instructors mentioned that the students often were able to identify when they had made a mistake when fingerspelling, demonstrating that they know the rules well. This then led them to believe that separate attention to the specific rules of fingerspelling and numbering through a separate course is in fact helpful in some ways.

They also added that there are many rules for fingerspelling and numbering and a separate course would help the students gain better knowledge of these rules. As a general rule, one instructor summarized it this way:

> non-deaf people are very weak with fingerspelling and numbers and if a new word is fingerspelled, non-deaf people will typically not be able to catch it while Deaf people will. Non-deaf people require a lot of practice to recognize fingerspelling so a separate course will be great for them to practice fingerspelling and number signs. A separate fingerspelling course will help them develop appropriate fingerspelling by using the appropriate rules. When they learn the basics, this foundation will help them to advance their fingerspelling in the future.

Also, students need to remember to maintain eye contact as opposed to focusing on the hands of the signers. One of the two instructors felt that basic fingerspelling should be taught in ASL level 1 because fingerspelling will be used in this level: "With this basic foundation, the students will continue to learn about fingerspelling in an appropriate way. If they have been given an appropriate foundation, then the students who enrol in the DSP should be ready to continue their education with a more advanced fingerspelling and numbering course". The students should already know the basic elements such as alphabet fingerspelling in order to enrol in DSP. During the interpretation program, they should have one or two mini lessons to keep reminding them of the rules and so on, but during DSP one semester should offer a fingerspelling and numbering course to focus on elements specific to them.

***Interview question 5: Share your opinion regarding what you feel would be most beneficial for students to improve their receptive skills in fingerspelling and numbering? A. Do you have any specific teaching strategies regarding fingerspelling or numbering? B. Do you have any learning strategies for students to aid them while learning fingerspelling or numbering?***

In this section, instructors shared their opinions about the most beneficial way to assist students to improve their receptive skills in fingerspelling and numbering. In addition they shared their general teaching strategies that they have altered to assist them when teaching fingerspelling and numbering. This section has been divided into four categories including: curriculum and resources, teaching, practice, and activities used to assist in the students' education.

***Curriculum and resources***

A number of fingerspelling and numbering curricula were identified by the instructors as offering beneficial teaching strategies. A few instructors noted that they would have never thought to use such strategies if they were not in the curriculum. One such strategy is used when teaching students how to appropriately signed phone numbers. It states that it is important to sign the first three numbers, pause for a short while, then sign the last four numbers. When Deaf people sign a phone number, they seem to not pause but in fact do pause but the pause is much shorter. When teaching how to sign a phone number, it is important to emphasize the use of a pause. Another example is to teach them to use the correct hand position in the appropriate space.

An additional material that was identified as beneficial was a video by Laurene Gallimore from Signing Naturally level 3 (Mikos, Smith, and Lentz, 2003). Materials like

this video that emphasize receptive fingerspelling need to be incorporated in the classroom in order to help the students understand how to receive fingerspelling in order to understand it. They must be taught to not focus on each letter but to look for the shape of the whole word as well as the context it is being used in. You cannot just fingerspell a word without context, because without context the letters will not have meaning. When Deaf people fingerspell to each other, an understanding is there because they each know the context the word it is being used in. Another example of this would be to encourage the students to catch the first and last letters of a word, or to notice the movement of the fingerspelling.

The Signing Naturally books were also mentioned as beneficial resources for teaching students the appropriate way to sign items such as ordinals, money, and proper number signs and to explain the rules for numbers in more detail. Additionally, the companion workbooks are highly recommended for their receptive tools and the additional opportunity to practice receptive skills by watching the signer on the DVD.

Most instructors felt that more fingerspelling and numbering resources are needed for students to help them improve their receptive skills. One instructor interestingly suggested that a group of Deaf individuals should collectively develop practice materials for the students. By doing so, they would be ensuring that the material would match the students' needs as well as ensure that the instructors were teaching them properly and completely. This would require testing these materials to ensure the materials and resources are appropriate and effective.

One instructor commented that she/he would love to have a DVD developed to be used in the computer lab. The DVD would be created around a theme, perhaps animals.

At the beginning of the video the students would be made aware of the topic, in this case animals, in order to help them create a context. On the screen there would be a signer along with 4 squares with the names of 4 different animals. The signer would fingerspell the name of an animal and the student would then click on the square she/he thinks matches the name just fingerspelled. With each completed level, the game would increase in difficulty by maybe having four squares that have very similar words that all start with the letter "C" and end with the letter "R", or words that have double letters, or other complexities to challenge the students. At the end of the game, the students would be given a score letting them know how they did. This type of game would allow the students to practice their receptive skills on their own time or during lab time. This instructor would love to see something like this created but this will take time and resources to develop.

***Teaching***

Instructors had suggestions for several teaching strategies regarding fingerspelling or numbering. The teaching strategies have been discussed below:

- It is important to have fun in the classroom. A fun and energetic environment allows the students to learn about fingerspelling or numbering with ease, thus allowing them to remember better and feel safe and comfortable to make mistakes. By laughing at their own mistakes, they are able to build confidence and continue to develop and improve as opposed to a negative classroom environment, which diminishes their self-esteem. They will struggle the most receptively as catching words is the most difficult skill to develop. So again, it is important to have a fun environment for them to keep their motivation high so they continue to learn.

- Teaching them to only fingerspell without context is not a good way. It is best to use context that has fingerspelled words for the students to figure out what word will possibly be used.
- One instructor often asks the students what she/he just fingerspelled. The students are often unable to tell she/he and so the instructor reminds them to interrupt and ask for the word again. If a Deaf person misses someone's fingerspelling, she/he will stop the signer and ask for it again. The Deaf individual will repeat the fingerspelling slowly once and typically after that the Deaf person will be able to identify the word.
- Teach the students to look at the first, middle and last letters of the word and learn to recognize the word as a whole.
- The students must look at the context first to help them think of potential terminology that may come up in the conversation. If you look at the topic specifically, the potential terminology is reduced and refined to fewer words.
- Students need to be aware of their spelling as they will often misspell a word or spell it phonetically and they need to pay attention to the suffix of the word they are fingerspelling.
- It is important for the students to know such things as a signer should not sign "quarter to nine" but should instead sign as "8:45" because that is how Deaf people sign time. Sometimes non-deaf people sign "eighteen hundred" which is based on spoken English but Deaf people always sign "one thousand eight hundred".

***Practice***

During the interviews many instructors offered several learning strategies for students to aid them while learning fingerspelling or numbering beginning with practice

on a regular basis. By challenging their repetitive skills regularly, they will not only be able to identify common mistakes or habits but will also force themselves to learn and better understand the rules associated. Moreover, the students need to learn the theory behind fingerspelling. A 'fingerspelling warm up' period at the beginning of their semester should also be added as their handshape and movement is still awkward. At the beginning of the semester their production is slow but as the semester progresses, so does their skill. Additionally instructors suggested encouraging students to practise on their own time or by redoing lab classes that are the most challenging for them. Examples mentioned in the interviews are listed below:

- By watching various Deaf native signers on the website i.e. www.ASL.com, on video or by watching Deaf individuals or their instructor signing live, they can practice their receptive skills and discuss the context and the word configuration in class. Deaf native signers offer variations in fingerspelling styles and speeds of fingerspelling, so by exposing themselves to these various styles, students can increase their knowledge base. It was also suggested that it would be best for the students to avoid those who fingerspell at a slow speed.
- Become familiar with handshape and movement by focusing on the shape of the whole word as opposed to each letter individually. By continuously exposing the students they will become more accustomed to fingerspelling and number signs and will become more familiar with these strategies. Also, encourage students to practise fingerspelling in the mirror allowing them to see themselves, their handshapes and movement.

- In the lab, the Educational Assistants can offer practice activities, however, if the students are experiencing difficulty with either receptive or expressive fingerspelling then a tutor may be needed.

***Activities***

A number of instructors touched on the specific practice opportunities they have developed for their students in order to increase their practice opportunities. Some instructors offer fingerspelling and numbering practice in their lab or in the classroom once or twice a month, while other instructors offer fingerspelling and numbering practice three times a week for the full semester. A number of instructors mentioned that various activities seemed beneficial when practising fingerspelling and numbering skills. Such activities are explained below:

- Playing games, for example, a relay game that will help students to practice their receptive skills. They learn to watch the instructor's fingerspelling and by writing the word on the board, the instructor knows if they were successful or not.
- Students should play with number signs and develop mini stories with the numbers signs. After the students have created a fun way of fingerspelling a word, they can share this with their classmates.
- Encourage them to go out, meet and interact with Deaf people everyday and make plans with their Deaf community friends. This is a great way to learn strategies and a wonderful way for them to practise their receptive skills, which will be forever useful.
- During fingerspelling class, one instructor commented, the students will have the opportunity to practice in either partners or in groups with the instructor, while the rest of the class practices independently. The students will either switch groups or

change activities to a game. This switch will happen after a fingerspelling or numbering PowerPoint lecture explaining structure, rules, tools or usage followed by discussion and questions. This usually takes roughly 30-40 minutes.

- "Popcorn Chain Game": All the students are given a stack of cards. Each card has a word on either side. The words on each card will match up with someone else in the room. The first person fingerspells one of her/his words and her/his classmates need to see if they have the matching word. If they do, then they will flip their card and fingerspell the word on the other side to the class to establish the match. If every word is matched correctly then the class should be able to go through all their cards successfully. However, if someone misunderstands a word and incorrectly matches it then the game will eventually break down and they will need to start again. This game encourages the students to increase their speed of receptive skills.
- Telephone relay: The students all stand in a line without looking at each other. The first person fingerspells a word to her/his neighbour who in turn fingerspells the word they received for another neighbour. This continues on to the end of the line at which point the last person will fingerspells the word they received to the person who initiated the game to see if the word is indeed the same as the one the game began with. This game encourages student to fingerspell faster and improves receptive skills.

***c. Do you want to share any more of your experience related to teaching fingerspelling and numbering?***

Most of the instructors shared their experiences related to teaching fingerspelling and numbering, and several of them had amazing ideas for the students, which are quoted below:

- For testing purposes, I create videos that include fingerspelled words and numbers. The student will need to identify the words and numbers receptively and then expressively repeat them back to me. They will do this by recording their answers on video. I will then not only be able to mark them on their receptive skills but on their expressive skills as well. I can then also offer them feedback on their numbering or fingerspelling expressive skills to help them learn how to properly use fingerspelling or number signs as well as recognize fingerspelling and numbers.
- I still believe that a separate course is essential for the students to learn the fundamentals of appropriate use of fingerspelling to ensure that for the rest of their lives they will fingerspell correctly. If a course like this is not available then they will only be left with the option of learning through informal conversations or from ASL classes along with grammar structure and classifiers. I wonder if these are their only options, how will they ever learn to fingerspell such things as "E" appropriately, or correct hand positions, movements, or to know to catch the first and last letters or even the basic fingerspelling rules. To me, it does not matter how much they end up learning about fingerspelling, if its 5% or 20% it will still be worth it. A separate course will provide the students with learning opportunities that include games or practice times. Some students may feel bored.
- Fingerspelling and numbering are essential for the student to learn because they will one day become interpreters. If the students just want to use ASL for the purpose of conversation, it will not be as important. For an interpreter, when they interpret in medical, legal, or education settings, there is a great deal of terminology and so they

must know how to use fingerspelling and numbering properly. They will require a great deal of practice.

- We live with fingerspelling as part of our language and there is no way to avoid it. Number signs are also a part of our language but are not as prominent or used nearly as often as fingerspelling. Phone numbers, addresses and math are examples of things that you do not often encounter in conversations so perhaps more attention and practice should be given to numbers for this very reason. Even though these numbers are not used often, interpreters must know how to express and read them correctly.
- I have noticed that there are several different number signs used when representing phone numbers. Research needs to be conducted in this area to see how Deaf people sign phone numbers. This type of research would determine how they should be signed or if there are options, because various acceptable number signs need to be identified. Once they have been identified, then we can share this information with our students in order to educate them appropriately. Information like this will only help us to better educate our students regarding number signs and fingerspelling.
- Finally, it is important to teach students how to produce fingerspelling properly. Some students use inappropriate production, which makes it difficult for others to read their fingerspelling. One great piece of advice, if the students are using incorrect production then they should hold a small ball in the palm of their hand to force them to fingerspell with a rounded handshape. This will discourage a flat handshape and encourage the desired curved hand. If their hand is in a curved shape, their fingerspelling will be clear thus making it easier to read their fingerspelling.

**Conclusion**

In this chapter, the results from the students' survey, and pre-tests and post-tests are presented. The survey provided information about the students' involvement with Deaf people in their lives and their level of ASL. This section also included the students' skill level and knowledge related to fingerspelling and numbering and rules.

An analysis and comparison of scores with respect to catching fingerspells or number signs was conducted. The pre-tests and post-tests asked questions about fingerspelling and numbering rules to help determine students' level of comprehension and if their knowledge increased within the 3-month test period. The findings of the analysis showed that the participants did not dramatically improve their scores within the 3-month test period between the two programs at two different colleges. Moreover, no noticeable difference in scores was identified when comparing the two colleges, regardless of whether or not a fingerspelling and numbering course was offered. Only a small number of participants increased their scores between tests while the majority of the participants showed no improvement.

Lastly, the interviews offered insight into the instructors' thoughts and experience of teaching fingerspelling and numbering and their opinion regarding a separating fingerspelling and numbering course.

# Chapter 5: Discussion and Recommendations

The original intention behind this research was to determine if a correlational relationship existed between offering a separate fingerspelling and numbering course and an increase in second language ASL learners' receptive skills in this area. Due to the limited number of participants, such a comparison was not possible; however, the data collected did provide a thorough description of the challenges and benefits to learning ASL fingerspelling and numbering, as well as insights regarding effective strategies for teaching these complex practices and rules. These findings and their implications are discussed in this chapter. The data collected regarding the assessment of students' receptive skills in both fingerspelling and number signs through the three videos and direct questioning about rules in the pre- and post-tests is further analyzed and questions raised are addressed. Additionally, a summary of the instructors' perspectives regarding a separate fingerspelling and numbering course in their respective programs is discussed in this chapter. Finally, the limitations of the study are reviewed and recommendations are provided for the benefit of students, instructors, and future researchers.

## Research Questions

**Do second language ASL learners who take a separate course in fingerspelling and numbering develop better receptive competency in these areas than second language learners who are taught fingerspelling and numbering within a general ASL course?**

Across the pre-test and post-test data, no meaningful differences between tests could be found. The data compared students from two programs to see if the students developed better receptive competency resulting from a separate fingerspelling and

numbering course as opposed to taking only ASL courses, and again no differences between the two programs could be identified through the students' scores. It was, however evident from the survey data, that an increased use of ASL in daily interactions led to an increase in receptive competency. This was indicated by data from the four students in the study who identified as having Deaf family members as part of their immediate families, Deaf relatives or a Deaf friend for more than five years. Consistently, the scores of these students were higher than the rest of the participants who did not have any Deaf relatives or close Deaf friends for a longer duration than two years. The consistently higher scores of these four students, along with their steady exposure to ASL outside of the classroom, clearly indicated that the increased use of ASL in their daily interactions positively correlated with improved receptive competency. Some aspects of the study design in terms of the number of participants recruited and the test format/procedure may also have influenced the findings. These are discussed in the Limitations section.

Additional questions addressed in this study:

a) **How much knowledge do the students have at the beginning of the semester in relation to the fingerspelling and numbering rules and will this knowledge be increased by the end of the semester?**

The researcher's expectation was that the target group would know more about fingerspelling and numbering rules than the control group as they had access to a fingerspelling and numbering course in addition to their ASL course. The results, however, showed no difference between the two program conditions. Also, it was

surprising to see that the majority of students knew and were able to identify some general fingerspelling rules in the pre-test, the correct hand position, as well as some strategies for understanding the fingerspelling rules. When students study Signing Naturally Level 1 (Smith, Lentz, and Mikos 1988), they are not offered many general fingerspelling rules and, therefore, should not have much knowledge of them. They could though have taken other ASL classes or have gained knowledge of rules through interactions within the Deaf community or with Deaf individuals prior to entry to the DSP. Most of the participants did not, however, have knowledge of specific fingerspelling or numbering rules during the pre-test. This lack of specific knowledge included such items as: not knowing the other term used for loan signs, and the inability to state the rules for loan signs, four digit numbers, cardinal numbers, dates or sports. As mentioned previously, only five of the 15 participants that took the pre-test also completed the post-test. Only one participant stated she/he felt restricted by time constraints and wrote, "not enough time to answer", and also did not take the post-test. A possible reason for other participants not taking the post-test could have been that there was no compensation offered for their time and effort. Some students put down "don't know" as responses possibly because it may have been too difficult for the students to explain their answers using written English, because ASL is a visual language.

At the end of the semester, a comparison of the data from the participants who took part in both tests was conducted. The data showed no increased knowledge of the general rules except for a small number of participants from both programs who gained an understanding of some specific rules, including those for loan signs, four

digit numbers, cardinal numbers, dates, and sports. There were also some inconsistencies noted in the pre- and post-test scores. One student responded, "I don't know" for many questions in the post-test, but the same participant had correctly responded to many of the same questions in the pre-test. A possible reason for this could be that the student simply wanted to complete the test as quickly as possible or did not have the motivation to respond to the questions again as she/he had in the pre-test. Another participant, who answered some questions incorrectly in the post-test, correctly responded to them in the pre-test. This participant had taken the time to offer a full response in the pre-test, but in the post-test, this person responded with one word answers which did not satisfy the question. For these reasons, it was felt that the results from the testing may not have truly reflected the participants' abilities, and may have been due to time constraints or lack of motivation, or commitment to the study.

For those students who had a Deaf member in either their immediate or extended families, there was no difference in their knowledge of the fingerspelling and numbering rules in comparison to the rest of the students. This might make sense because Deaf family members really do not teach or explain fingerspelling or numbering rules as they are more interested in just making conversation, so this did not surprise me.

**b) What level of receptive skills do students have at the beginning of the semester and will their skills improve by the end of the semester?**

In this study the researcher identified the participants as "not fluent", "moderate" or as having "fluent" receptive skill levels. The majority of the students fell under the not fluent category, a small number were considered to have moderate level skills, while none of the participants were thought to be fluent in their receptive skills. Of the participants who were identified as having a moderate level of skill, two disclosed that they have Deaf family members and have had Deaf friends for an extended period of time.

The data collected showed no improvements by the end of the semester in the students' receptive skills regardless of their level of competence at initial testing. This clearly indicated that a 3-month timeframe was simply not long enough to allow the students to improve their receptive skills, and that more practice and time is needed for them to increase their receptive skills in addition to continuing to use ASL in their daily interactions.

There are many reasons as to why no improvement was identified with regard to the participants' receptive skills. These reasons are discussed below.

In the fingerspelling course the target group was enrolled in, they learned many different elements or rules of fingerspelling and numbers, but they may not have had enough time to practice each element or rule to the point of becoming comfortable and proficient in its use before moving on to new elements or rules. As well, it seems difficult to consider that so many complex rules could be remembered in their entirety in such a short period of time; which would be necessary to ensure

full receptive comprehension. The students were given instruction for only 13 hours per week for a total of 13 weeks to practice fingerspelling and numbering rules. With no improvement found in either group's scores in receptive skills, it is likely that insufficient practice time was a factor for both the target and control group programs. The researcher did not discuss specific classroom approaches with the instructors.

The overall low scores on the tests, as well as the decrease in scores between tests for a few participants, points to some inherent difficulties in the test itself. The test used videos of Deaf people telling stories that incorporated fingerspelling and numbers. Many students may not have been used to identifying and labeling fingerspelling and numbering in such a context, and so may not have been attuned to recognizing these items. Numbers are often incorporated into signs and participants may have overlooked these items. This was noted with the sign for "one week" where the "#1" could have been overlooked or attention to this detailed information was not given. Additionally, neither the students from the target or control groups are given the opportunity in class to practice with various Deaf Canadian native signers on videos, but instead watch American signers in the class videos that accompany their textbooks. Therefore, seeing Canadian Deaf signers on the pre- and post-test videos may have been an increased challenge for them. The Deaf signers in the pre- and post-test videos were not expected to practice or overly prepare for their stories, they were simply asked to come in and share a story that would be recorded. This allowed for true footage of real native signers as opposed to a mock scenario with editing of incorrect grammar or other elements of native signers. The students may not be

familiar with the signing style or fingerspelling style. Seeing someone other than their own instructors may have added additional challenges as well.

During analysis of the data, it was noted that some students struggled more to identify fingerspelling as opposed to numbers, while others struggled to recognize numbers as opposed to fingerspelling. This could be due to the strong spelling skills of some students and weak spelling skills of others. Additionally, some students may naturally be better at numbers and so identifying numbers in ASL may be less challenging. It was also noted that many students struggled to identify the names of people and places as there is no way for a student to create a mental list of potential names that they may or may not have ever encountered. Participants also struggled to identify lexicalized words because these words look like signs to them, and so they may have understood the lexicalized words, but not identified them as fingerspelled items. Many participants overlooked the lexicalization of words.

**Pre- and Post-Test Comparison of Individual Participants**

Through the analysis and comparison of the pre-test and post-test results from both the program that offered a fingerspelling and numbering course and the other that did not, no noticeable improvement could be found. A palpable difference in scores could not be identified as the students either increased their scores by only one to two points, decreased by only one to two points or there was no change in their scores at all. However, when evaluating the data from the fingerspelling and numbering rules portion of the test, a small improvement with specific fingerspelling and numbering rules was noticed dealing with such areas as sports or dates.

Of the five students who completed both tests, only one had an immediate family member who was Deaf and had used ASL for more than 9 years. Another of the five had an extended family member who was Deaf and had used ASL for more than one year. Two other students have had Deaf friends for one to two years and the last student did not have any Deaf family members or friends prior to entering the DSP, but had used ASL for approximately one to two years. The student who had used ASL for more than 9 years received the highest score on both tests in comparison to the other four participants. The other participant, with the extended Deaf family member, showed the most improvement from the pre-test to the post-test. It was surprising to see that the student who had only been using ASL for one year and who had an extended family member had managed to score almost as well as the student who used ASL every day at home. The predominant reason for this is likely the passion this student has to learn ASL and possibly the considerable time spent interacting and using ASL with this family member, even though, the researcher had no idea how often did this participant involved with her/his extended family member. However, I believe that if a student is passionate about something, in this case learning ASL, they will do so much quicker as opposed to someone without passion or drive. With the purpose, there is a reason for person to motivation as discussed by Kytle (2012):

> Self-focusing requires explicit purposes and the psychological and physical energy to purse them. Without purpose, self-focusing has no signposts. If I have learned to value certain purposes, I can work to make them come true (p. 69)... Still, a serious challenge at any age is knowing what we want to do, or want to learn. This is a true for daily life motivation as for high focus applications, and it is true for implicit, informal, and formal learning (p. 114).

The other three students' scores were very low as they did not use ASL on a daily basis and so have not been exposed enough to allow for improvement in their receptive skills.

The five students who took part in both the pre-test and post-test all struggled with similar words which included, for example, the name of a place (#COTTAGE), a store name (#SAFEWAY), and person's name (#SUSAN). One needs to remember that the students were not able to rewind the videos during the tests. In real situations, an individual is able to stop the speaker and seek clarification of the name or word they did not receive successfully. Additionally, the difference between a live signer and a signer on a flat video screen might itself impact the students' receptive ability. The inability to seek clarification could potentially be the reason why they all struggled with these words or names. In addition, for the three students who had only been using ASL for less than two years and did not have Deaf family members, they may not have been aware that an age or a date is considered a numbers as opposed to a signs. Their minimal knowledge may have played a role in their incorrect responses. Additionally, the student with the Deaf immediate family member did exceptionally well with the lexicalized words in comparison to the other four students. Lexicalized words have their own unique, repetitive movement and handshape, so it is common for students to overlook lexicalized words or difficult to recognize that they are spelled words as opposed to signs.

**c) What impact did the additional fingerspelling and numbering course have on the target group?**

Unfortunately, the data showed the additional fingerspelling and numbering course did not have an impact on the target group, as their receptive scores did not change significantly. The separate fingerspelling and numbering course ran for three months. The lack of improvement seems to show that this time frame is simply too short to allow for a substantial improvement of the students' receptive skills in the students, Complete details regarding classroom approaches or teaching activities were not collected, therefore, this study is unable to comment on whether or not they too influenced learning. Also, the number of participants who completed the post-test was low, therefore, these results must be interpreted with caution. There was, however, indication that the students from both programs showed some improvement of their understanding of fingerspelling and numbering rules. It appeared that increased understanding of fingerspelling and number rules did not immediately help the students to improve their receptive skills, but they did gain knowledge. It is possible that these gains may have had more impact on their expressive fingerspelling and numbering skills, although these were not measured in this study.

The target group used the Fingerspelling 1 (Keast, 2005) for their fingerspelling and numbering course and the Signing Naturally Level 2 and 3 (Lentz, E. M., Mikos, K., and Smith, C, 1989 & 2001) in their ASL course for both semesters, while the control group used only Signing Naturally Level 2 and 3 in both semesters. The Fingerspelling 1 (Keast, 2005) includes basic rules of numbers and activities for students, which focus on time, age, two-digit numbers, quantity, phone numbers,

years, and long numbers. It also includes an explanation of general fingerspelling and eye contact rules and offers specific rules and activities for the students which focus on acronyms, names, categories, hand locations, double letters, short words (lexicalized words), nomenclature, rhythm, and misspelled words.

Signing Naturally Level 2 (Lentz, E. M., Mikos, K., and Smith, C, 1989) offers a separate segment to learn basic fingerspelling and numbering rules in the curriculum, which introduces the numbers 101 to 1,000, rules for dates and address, money rules, and double letters without explaining the rules of double letters. Lexicalized words were incorporated into the ASL course throughout the lessons.

Signing Naturally Level 3 (Mikos, K., Smith, C, and Lentz, E. M, 2001) provided explanations of rules about percentages and fractions and ranking. It also incorporated numbers and lexicalized words throughout the lessons, but did not offer a separate time to explain these rules.

Fingerspelling 1 (Keast, 2005) offered more explanations in regards to rules and provided more activities on fingerspelling and numbers in comparison to Signing Naturally Level 2 and 3 (Mikos, K., Smith, C, and Lentz, E. M, 1989 & 2001).

It was expected that a significant difference would be found between the two groups, as the target group had been exposed to more explicit teaching about complex fingerspelling and numbering rules and had an opportunity to practice receptive and expressive fingerspelling and numbering. Although this study found no such difference, it is difficult to conclude, given the small number of participants (n=5) being compared across the two groups, that such explicit teaching does not have an impact. There do appear to be other factors, such as length and frequency of exposure,

and regularity of authentic use of ASL that also contribute to students' abilities to understand fingerspelling and numbers.

**d) What differences were identified when comparing the target group to the control group?**

There were no identified differences when comparing the target group and the control group based on the test results, but the survey did identify one significant difference between the groups. The survey showed how the students from the target group felt strongly that a fingerspelling and numbering course in addition to their American Sign Language course was needed while in the control group only one student felt this way. This difference in opinion between groups is possibly due to the fact that the target group was familiar with a separate class and had the opportunity to experience the benefits that come along with it, including an awareness of the many complex rules involved. Additionally, the responses were intriguing because the same questions elicited very different responses in the two groups. A potential reason behind this could be that the questions themselves were not clear enough. Perhaps the participants thought that a separate course meant only focusing on fingerspelling and numbering without an ASL element. Alternatively, they may have thought an additional course meant additional focus and practice on fingerspelling and numbering knowledge and practices while still building on ASL skills in general.

One strong similarity between both groups, however, was noted when asked about the benefits of learning more specific elements related to fingerspelling and numbering. The majority of participants from both groups strongly agreed that this would be

beneficial to their education, as they have learned that there are many elements and rules of fingerspelling and numbering. The data show that the students from both programs did increase their knowledge of some specific fingerspelling and numbering skills by the end of the semester.

**Instructors' perspective**

Of the five instructors interviewed only two instructors strongly believed, due to their past experiences, that a fingerspelling and numbering course should be taught separate from ASL. Two other instructors were undecided when asked if these items should be taught under one course or separately. They did, however, comment that if a student needs more advanced fingerspelling and numbering then it should be offered either in class or in the lab of the interpretation program and not the Deaf Studies program. In contrast, only one instructor believed that fingerspelling and numbering should not be offered as a separate course from ASL.

The overall interpretation of the interview data collected is that if a separate fingerspelling and numbering course is taught, it should be offered either during the second semester of a Deaf Studies Program or in the first year of an Interpretation program. This separate course could be used to supplement the programs that use the Signing Natural Level 3 (Smith, C., Lentz, E. M., and Mikos, K, 2001) in the second semester of a DSP, which does not offer much with regards to fingerspelling and numbering rules. Also, ASL curricula that were developed by instructors, to teaching AEIP students, may or may not offer any additional fingerspelling or numbering rules in their curriculum. The data showed that the students' receptive skills were not yet fluent in the first semester of their studies, therefore, more practice on their receptive skills was

still needed in addition to continued use of ASL in their daily interactions in order to develop better receptive competency.

It was very interesting that all the instructors interviewed used Signing Naturally Level 1 to 3 (Smith, C., Lentz, E. M., and Mikos, K, 1988, 1992, & 2001) to teach the students and expected the students to work from the student workbooks from this program. However, various curricula in addition to the Signing Naturally texts were added for the students to practice their fingerspelling and numbering during either classroom or lab time. It was noted that during the interviews the instructors had similar ideas on how to teach fingerspelling and numbering, these included: 1) practice lexicalized words to become familiar with these words by focusing on the whole word as opposed to focusing on an individual handshape; 2) explain the rules of fingerspelling and numbering; 3) remind the students to maintain eye contact with the other signer; and 4) keep up with the context in order to be able to find words that relate to the topic of discussion. During practice time for their fingerspelling and numbering, all of the instructors always provided individual activities for the students or organized partner or group activities to allow them to practice their fingerspelling or numbering. Also noteworthy was the identification that most instructors tended to practice fingerspelling slower than their normal rate of signing at the beginning of the semester and increased their rate of speed in the middle of the first semester. As an instructor who has had discussions in the past with other educators of ASL, signing at a slower rate has always been slightly controversial as some Deaf instructors feel they should always sign at their normal signing speed. Because of these past discussions, I, the researcher, had never considered it to be common practice among other instructors to follow this method. After

reviewing the interview data, it was clear that most instructors indeed did begin signing at a slower rate and then slowly increased their signing speed as the semester went on. Most instructors had one comment in common, and that was the strong belief that the students need approximately two to three years of daily receptive skills practice.

During the interviews the instructors shared some important strategies and curriculum materials that I believe would be beneficial to include in a fingerspelling and numbering course.

**Strategies**

It is important to teach, discuss, and explain lexicalization, and the unique handshapes and movement of words to ensure that the students know to watch the words as a whole instead of individual letters. Although the goal is to process fingerspelled words as a whole, it is still not known how best to teach this approach, how students eventually learn to do it, or how long it takes to learn. It is also important to give the students tools and techniques for fingerspelling and numbering, such as, configuration, context, catching the first and last letters of fingerspelled words to assist in identifying the word, to name a few. Students need to know these fingerspelling and numbering techniques to help them in their continuous practice and instructors need to keep emphasizing that these techniques will help students' receptive and expressive skills become better. They need several years of incorporating these fingerspelling and numbering techniques in their practice for their receptive skills to improve. The students also need to be reminded that they should not become comfortable with the slow signing speeds that they see on their videos but to challenge themselves to continuously familiarize themselves with gradually more rapid signing. Also, it is important to remind

the students that there are various styles of fingerspelling used by Deaf people, so they should not depend on only their instructors' style of fingerspelling and should also expose themselves to various Deaf individuals' fingerspelling styles. It does not come as a surprise that students have difficulty understanding uncommon words or unfamiliar words with regard to specialized topics. They will need to stop the signer and ask for clarification when this occurs.

Upon reflection, one can agree with the instructors that numbering is extremely difficult for students expressively. They need to be aware of the proper palm orientation when signing numbers or using number movements, for example, signing the number 76, requires the flip of the wrist. In addition, students experience difficulty when receiving numbers, as sometimes there is no contextual information to support the numbers, or sometimes this is a complex number that incorporates many place values, which makes it challenging to not only identify the correct values but also to remember the number in its entirety.

One foundational point that was brought up by all the instructors was how to begin teaching fingerspelling and numbering. It was pleasing to hear that everyone started with a slower rate of fingerspelling in the first semester and gradually increased the rate middle of the semester, until they reached their normal rate of fingerspelling and numbering speed, which is necessary to ensure that the students were comfortable with their signing and fingerspelling style.

**Researcher's Insights on Curriculum Materials**

As a Deaf instructor who has had many years experience educating DSP and AEIP students, I, the researcher feel it appropriate at this time to share my views. I

strongly agree with the instructors that students should have access to a Canadian fingerspelling workbook and have Canadian signers on the videos because students tend to become confused with the American style for signing numbers, which is different from the Canadian style of number signing. It would be tremendous to have several Deaf instructors from colleges across Canada come together to work at developing a new Canadian fingerspelling and numbering workbook for Canadian students and other such materials for instructors to use in the classroom. If this is not possible then another option could be to have the Deaf staff from one college work together to develop new curriculum for their program or hire someone to develop this curriculum. I would appreciate incorporating several of the instructors' materials and activities shared during the interviews into my classroom or lab, these included:

1) DVD with several themes—the students would have an opportunity to practice their receptive skills by picking one of four squares they feel best matches the name or word they just received; 2) encourage students to interact with Deaf people in the Deaf community; 3) popcorn chain game which was mentioned in Chapter four; 4) when students use inappropriate hand production, offer them a small ball to encourage them to fingerspell with a rounded handshape that represents the desired curved hand.

When I interviewed the instructors, I posed question about whether or not a separate fingerspelling and numbering course should be offered or if fingerspelling and numbers should be incorporated into ASL teaching. At this point in time I would like to offer my perspective on this question as well. After collecting and reviewing the data, interviewing the instructors and considering their responses, I still strongly believe that fingerspelling and numbering should be taught as a separate course, as well as being

incorporated into their ASL course. During an ASL course there are lessons that focus heavily on classifiers, use of space and grammatical structures, but these lessons are limited to basic fingerspelling and numbering concepts, which do not offer a lot of opportunity to practice fingerspelling or numbering. As was mentioned earlier about Signing Naturally 2 (Mikos, K., Smith, C, and Lentz, E. M, 2001), it does not offer fingerspelling and numbering in its curriculum. It would be far more beneficial to have a separate course to allow the students the opportunity to practice and learn more about fingerspelling and numbering. Fingerspelling and numbering have many complex rules and specific elements that students should know and understand well. This is not to say that the students need to focus on and work for hours on only a fingerspelling and numbering course, but in addition to their ASL course. The instructors and students who took part in this study both identified that students struggle with fingerspelling and numbering. In the survey portion of the study, when asked if they would like an additional fingerspelling and numbering course, the majority of students acknowledged the need and felt it would in fact be beneficial. I believe that an additional course should be offered to the students who have completed Signing Naturally Level 2. It does not matter if the students are studying to become interpreters or learning for pleasure, they should learn the many fingerspelling and numbering rules and specific elements. As well, when considering how other languages are taught, for instance English, spelling is assigned dedicated times to focus solely on that skill (still within the overall context of the language), and so it seems only appropriate to compartmentalize some areas of ASL acquisition to allow for scheduled time to develop the skill of fingerspelling and numbering. A very important point made by Patrie & Johnson (2011) mentions that

fingerspelling is very challenging for second language students as they struggle not only to understand the fingerspelling but the whole message as well from various signers. As well, they mention that producing fingerspelled words is a challenge, however, they believed that if an individual had enough time to practice both receptively and expressively then both skills would gradually improve.

During the research process, it was identified that the instructor's belief regarding teaching fingerspelling and numbering would influence the way they chose to approach it in the class. If they felt strongly that fingerspelling and numbering are essential parts of ASL then they would include them in the classroom activities as well as their lessons. This relates to the point that was made regarding very few instructors having a full understanding of the theory of fingerspelling, and so it was recommended that formal training and workshops be offered to those who teach fingerspelling to ensure they are able to deliver the information fully and appropriately (Wilson, 2011).

In addition to the above information, as the researcher, I would like to add my opinion based on the literature reviewed that discussed the history of fingerspelling and how it has changed throughout the years. It is important to have the history of fingerspelling included in the curriculum to help the student understand why older Deaf people value fingerspelling more than younger Deaf people. Without such information, students are unable to understand how age can influence the perspective of using fingerspelling and numbering. Without sufficient education, the students are unable to understand how the use of fingerspelling and numbering has changed from the past to present.

The interviews conducted for this research were extremely beneficial. They allowed the researcher to see the similarities in teaching styles, materials, activities, and splendid techniques offered to the students. This information can be shared with other instructors to improve the overall materials, activities, and teaching strategies. All of this exchange of ideas will only help our students to improve their receptive and expressive skills of fingerspelling and numbering. Reviewing instructors' perspectives regarding a separate course will assist us in deciding whether to keep or remove the additional fingerspelling and numbering course in our Deaf Studies Program.

**Limitations of the study**

While conducting the tests, surveys and interviews with the instructors, several limitations of the study were observed. The limitations of the study have been divided into the three categories of: procedure, technology, and test.

**Procedure**

The expected distribution of the pre-test scheduled for September 2014 had to be delayed, as approval from the Education/Nursing Ethics board was not received until early October 2014. After receiving approval from the Ethics board, the pre-tests were sent to both programs. This late start date was not ideal as the participants from both programs were already a month into their studies of ASL and/or fingerspelling and numbering.

The post-tests, which had originally been scheduled for the end of the first semester, had to be postponed for both programs to the beginning of January, as a 3-month timeframe was needed for the research. Many students from the control group were away with the flu while the target group was postponed due to computer issues.

A number of the instructors I interviewed were also my coworkers. They were asked to answer the interview questions as honestly and as fully as possible and to share their true opinions. I acknowledge that although I attempted to maintain as neutral an opinion as possible during the interviews, I may have influenced their responses not only because of my relationship with them, but also in relation to conversations regarding a separate course that may have happened before the research began.

Finally, a small number of participants from only two programs took part in the survey and tests for this study. A better set of data could have been collected if more programs had taken part in the study, which would ultimately increase the number of participants.

**Technology**

The participants from the target group were unable to access the videos on the day of the pre-test, as the lab's flash drive software needed updating. This caused a rescheduling of the pre-test to a later date, as the technical support person was unable to resolve this issue immediately. Owing to this delay, potentially some participants may have been lost, as their interest may have faded or they may possibly have been unable to take the test at a later date.

Additional technological concerns arose after a number of the participants experienced difficulty when attempting to access the website for the pre- or post-test. The cover letter that had been distributed by the coordinator or designator had the website address, but when copying from the letter, a number of individuals incorrectly typed the address into their search engine. This issue could have been avoided if a website had

been designed as opposed to a letter that included a link leading the participants directly to the tests.

**Test**

A total of 55 potential participants in the survey, pre-test and post-test were identified from the two participating programs. Of the 55 students, several expressed their disappointment that they would not receive compensation if they participated in the tests or survey, and therefore, possibly chose not take part in the study. In addition, a number of students were not interested in taking part in the study as they felt their skill was not at a level where they would be able to understand the Deaf signers on the videos or the fingerspelling and numbering rules. As well, the pre-test had been scheduled for the same week as mid-terms and so a number of students chose not to participate in the test in order to allow for more time to focus on their studies.

Each test included three videos totaling 9 minutes of video footage. Each video ranged between two to four minutes in length and included roughly 33 to 36 fingerspelled or numbering items that needed to be identified by the participants. It is believed that during the pre-test, some participants may have felt overwhelmed by the length of the videos and the amount of items presented, potentially leading them to withdraw from the study. In addition, the videos included some words and numbers that appeared more than once. It may have been the students' understanding that an item did not need to be recorded more than once thus causing a low score. Furthermore, participants may not have been interested in answering questions regarding fingerspelling and numbering rules, and therefore, chose not to do the test.

The second portion of the pre- and post-test focused on fingerspelling and numbering rules. The researcher inaccurately asked the participants in the second question of this section to discuss the general "receptive" fingerspelling rules. Instead, the question should have asked the participants to discuss the general fingerspelling and numbering rules. In addition, several questions dealt specifically with fingerspelling or numbering rules. It seems students thought they had to answer these questions in detail and so chose to either not give an answer or struggled to write the rules in English. The students may have had an easier time answering these questions if given the option to answer them in ASL, a visual language. Moreover, generally speaking, the questions in part 2 were not answered in great detail. This could also have been a result of the single option to respond to the questions in English, as opposed to offering students the choice of responding in ASL or English. In retrospect, although they would measure students' recognition rather than recall of the subject, multiple choice responses could have been offered to assist the students in finding the best possible response to the questions. Additionally, the lack of detailed responses could have been due to time concerns about time (in relation to completing the test) on the students' part.

At the end of the pre- and post-tests the students were not asked to add any additional comments but in retrospect a "Comment" section should have been added just as in the survey.

The survey was only administered at the beginning of the semester, but should have been administered again at the end of the semester as well to allow the researcher to identify any changes in opinions regarding a separate fingerspelling and numbering course.

This chapter summarized the research questions based on the data collected in this study. This summary included the analysis of the pre-tests and post-tests individually and a comparison between of the target and control groups' receptive skills and knowledge of fingerspelling and numbering rules. An interpretation by the researcher of the data was also provided.

**Recommendations**

This thesis was designed to investigate whether or not a separate fingerspelling and numbering course would be beneficial for the students of Deaf Studies Programs to assist them in gaining a comprehensive understanding of fingerspelling and numbering rules as well as improving their receptive skills. As a result of this study, it is evident that much more research is needed in this area, however, based on the data collected in this research, it was clear that the participants had gained most of their knowledge of fingerspelling and numbering prior to entering a DSP. The research also indicated that although they had knowledge of rules, their ability to comprehend fingerspelling and numbering produced by Deaf individuals did not improve in either program throughout the 3-month testing period. It remains unclear as to whether or not it is essential or beneficial to have a separate course to assist students in gaining stronger receptive skills or improvement in their comprehension of fingerspelling and numbering rules when receiving numbered or fingerspelled information from a Deaf individual.

As a result of this study, it is evident that much more research needs to be done in this area. Several recommendations can be put forth based on the information stemming from this study. These recommendations are regarding the improvement of this study for

future research in order to facilitate additional study of a separate fingerspelling and numbering by way of course instructions:

**Recommendation 1:**A large-scale study is needed to investigate how to properly identify and assess the benefits, if any, of a separate course in ASL fingerspelling and numbering.

**Recommendation 2:** A longitudinal qualitative and quantitative study is needed to investigate second language ASL learners' receptive and expressive skills across different skill levels. This study is needed to measure, investigate and compare the progression of overall language areas and the impact it has on the development of fingerspelling and numbering abilities.

**Recommendation 3:** A receptive skills study is needed to compare non-deaf and Deaf individuals' skills of reading both fingerspelling and written text. Written text is read from left to right but fingerspelling is read from right to left. Deaf individuals have the ability to switch to match both ASL fingerspelling and written text while non-deaf individuals struggle when going from one to the other. Also most non-deaf people link written text (and possibly fingerspelling) to the speech sounds represented by written letters, and this may interfere with their processing of fingerspelling. I believe it would be beneficial to research this further to perhaps shed some light on why non-deaf individuals struggle with fingerspelling.

As a result of this study as well as my own experiences as an ASL instructor, the following recommendations are proposed as being beneficial to the students:

**Recommendation 4:** Students expressed the desire to take a fingerspelling and numbering course separate from their ASL studies. They expressed a lack of confidence with their receptive skills when reading a Deaf individual's fingerspelling and numbering. A separate fingerspelling and numbering course should be offered three hours per week and should be offered when the students are taking Signing Naturally Level 3 or higher levels of ASL.

**Recommendation 5:** Research needs to be conducted in the various signing styles used by the Deaf community. Although one Deaf individual may follow and use one rule for fingerspelling or numbering, that many other acceptable rules may exist. This research could include the many various acceptable signing rules for both fingerspelling and numbering. This could include, for example, the various rules for phone numbers or proper names and how they can be represented in ASL. This research would determine the various ways Deaf individuals sign phone numbers, for example, allowing for proper documentation of the acceptable signing options. This information could then be incorporated in the Deaf Studies curriculum ensuring further comprehension of ASL for students.

**Recommendation 6:** The additional resources mentioned in recommendation #2 could be added and applied to curriculum development for fingerspelling and numbering to be used by instructors in the classroom. Also, fingerspelling history should be included in the curriculum.

**Recommendation 7:** A Canadian fingerspelling and number workbook based on Canadian signers must be developed for Canadian students to use in their classroom.

**Recommendation 8:** Select instructors across Canada need to develop materials that are specific to fingerspelling and numbering. These materials should include several regional signers to expose students to various signers from across Canada.

## Conclusion

Unfortunately, due to a low number of participants from both programs, the present research findings were insufficient to offer strong evidence that an additional course in fingerspelling and numbering improve the students' receptive skills. However, this study was an initial attempt to assess second language ASL learners' abilities in fingerspelling and numbering and to discover more about how these practices are learned and taught. The study revealed some important insights:

This study confirms that fingerspelling and numbering are challenging for second language ASL learners. More exploration is needed regarding the kind of tools and materials that will actually help students improve their receptive skills.

The tests were created as an assessment to measure students' receptive abilities in context, but in retrospect, modifications to the test are needed. The first modification should be to give the students the opportunity to rewind the video to allow for more than one attempt at identifying the fingerspelling or numbering items. In addition, a test with a video as opposed to a live person may also have not been an ideal situation, as the students do not have the opportunity to interact with the Deaf participant, thus making it an unnatural interaction. A video is also a two dimensional representation of a three dimensional language, thus adding additional challenges to the participants taking the tests. If a live interaction were offered, a video of that live interaction could be made and

then reviewed by the researcher to measure receptive abilities. Another modification to the test could be to include a practice session as part of the pre-test and post-test procedure. It could be a short video with several fingerspelled and numbers items to give the participants an opportunity to know what to do when they take the real test. This is a good way for the researcher to better ensure the students are fully understanding the task and getting an accurate measure of the students' skills.

A separate fingerspelling and numbering course had been offered to some students to allow instructors the time needed to teach their students the many rules of fingerspelling and numbering. Further investigation is needed to identify if this separate course actually helped students improve their skills, and how such a separate course could be modified to assist in more substantially improving students' fingerspelling and numbering skills.

Again, it is essential to teach non-deaf students to focus on shape, style and movement in the context of signing fingerspelling and numbers, and also to train them to "let go" of their focus on individual letters.

Many instructors have excellent strategies and have developed innovative materials, but a formal curriculum with a Canadian perspective and signers is still needed. In addition, good resources and materials need to be developed for use in the classroom by instructors.

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**Appendix A**

**Fingerspelling and Numbering Survey**

The purpose for this survey is to aid the researcher in identifying students' skill levels regarding fingerspelling and numbering in ASL. The questions below will assist the researcher in furthering her studies in the area of fingerspelling and numbering to improve the courses offered to DSP students.

This survey is confidential and will be destroyed at the end of the study. Please do not write your name or number code on this form. Take your time in answering the questions.

**Number code:** _____

**Your personal information:**

1. What is your age?

O 17 – 24 (12 students)
O 25 – 34 (1 student)
O 35 - 44 (1 student)
O 45 – 54 (1 student)
O 55 or over (0 student)

2. Are you

O Deaf (0 student)
O Hard of Hearing (0 student)
O Non-Deaf (15 students)
O Other: ____ (0 student)

3. Are there any Deaf members in your immediate family?

O Mother (2 students)
O Father (1 student)
O Sibling (1 student)
O None (0 student)
O Other: ____ (0 student)

4. Do you have any Deaf relatives in your extended family?

O Aunt (2 students)
O Uncle (1 student)
O Cousin (1 student)
O Niece (1 student)
O Nephew (0 student)
O Other: ____(0 student)

5. Do you have any Deaf friends?

O Yes (9 students)
O No (6 students)

If yes, how long have you been friends?

O Less than 1 year (4 students)
O about 2 years (3 students)
O 3 to 4 years (0 student)
O More than 5 years (2 students)

6. Have you participated in any Deaf community events or activities prior to entering the Deaf Studies Program?

O Yes (5 students) O No (10 students)

If yes, how long have you participated in the Deaf community?

O Less than 1 years (2 students) O about 2 years (1 student)
O 3 to 4 years (0 student) O More than 5 years (2 students)

7. Where do you attend college? (To protect the student's confidentiality)

O Vancouver Community College O Douglas College
O Red River College O George Brown College
O Nova Scotia Community College

**American Sign Language level:**

1. What is your current ASL level?

O Naturally Signing Level 1 (3 students)
O Naturally Signing Level 2 (6 students)
O Naturally Signing Level 3 (4 students)
O Master ASL Level 1 (0 student)
O Master ASL Level 1 (0 student)
O Others: Fluent (1 student)
*One student leave blank

2. How long did you use ASL before entering the Deaf Studies Program?

O None (1 student) O Less than 1 year (2 students)
O 1 - 2 years (8 students) O 3 - 5 years (1 student)
O 6 – 8 years (0 student) O More than 9 years (3 students)

3. What level do you feel your ASL signing skills are at currently?

O Novice (4 students) O Between novice and intermediate (6 students)
O Intermediate (2 students) O Between intermediate and advance (1 student)
O Advance (2 students)

**Fingerspelling and Numbering Courses:**

1. Should a fingerspelling and numbering course be taught separately from an ASL course?

O Yes (7 students) O No (1 students) O Not Sure (7 students)

Any comment to add:

- I think it would help peoples receptive skills since receiving fingerspelling and dates is one of the hardest thing to understand.
- If class time is fully used and use wisely I think it would not be necessary
- I think it is beneficial to other students however, I don't feel as though this class benefits me enough for me to be in it.
- Stop charging students money to go to functions assigned by the college
- Fingerspelling is often one of the most challenge things for students therefore I think it is important for students to concentrate on this are separately from the vocabulary signing.

2. Do you feel it would be beneficial to learn more specific elements (such as proper name, lexicon, counting, etc.) related to fingerspelling and numbering?

O Strongly agree (6 students) O Agree (3 students)
O Not sure (6 students) O Disagree (0 student)
O Strongly disagree (0 student)

3. Should the Deaf Studies Program offer an additional fingerspelling and numbering course?

O Yes (11 students) O No (4 students)

Any comment to add:

- I think there are other crucial areas that could benefit from more focus
- I think it would be a neat asset
- I think this would be incredibility beneficial for ASL students. Particularly a course for practicing receptive skills for fingerspelling and numbering.
- I am finding the fingerspelling and numbering course to be very helpful in learning other aspects of ASL.
- I have noticed that other students struggle the most with fingerspelling so I think maybe the class should involved more basic practice in both receptive and expressive skills however this would not benefit me at all.

4. Would you prefer to have a Canadian fingerspelling and numbering workbook instead of an American workbook?

O Yes (11 students) O No (4 students)

5. How many fingerspelling and numbering levels do you feel the Deaf Studies Programs should offer?

O One (4 students) O Two (2 students) O Three (5 students)
O Four (2 students) O Five (0 student)

6. How many hours per week do you feel a fingerspelling and numbering course should be taught?

O less than one hour (2 students)
O One hour (4 students)
O One and half hours (1 students)
O Two hours (4 students)
O Three (4 students)

**Fingerspelling and numbering skills:**

1. How would you rate your experiences with reading a Deaf individual's fingerspelling and numbering?

O Very difficult (4 students)
O Difficult (3 students)
O Not sure (3 students)
O Easy (4 students)
O Very easy (1 students)

2. Are you nervous when reading a Deaf individual's fingerspelling and numbering?

O All the time (2 students)
O Most of the time (2 students)
O Sometimes (9 students)
O Not at all (2 students)
O Don't know (0 student)

3. Are you comfortable using fingerspelling and numbering in conversations?

O All the time (4 students)
O Most of the time (3 students)
O Sometimes (8 students)
O Not at all (0 student)
O Don't know (0 student)

4. What do you feel your fingerspelling skill is?

O Very fluent (1 student)
O Fluent (3 students)
O Moderate (8 students)
O Not Fluent (3 students)
O Don't know (0 students)

5. What do you feel your numbering skill is?

O Very fluent (0 student)
O Fluent (3 students)
O Moderate (7 students)
O Not Fluent (5 students)
O Don't know (0 student)

6. How well do you know the fingerspelling rules?

O All (3 students)
O Most (4 students)
O Some (5 students)
O Few (2 students)
O Not sure (1 students)

7. How well do you know the numbering rules?

O All (2 students) O Most (4 students) O Some (6 students)
O Few (2 students) O Not sure (1 students)

8. Do you have anything to add/comment?

| |
|---|
| There is no comment. |

Thank you for filling out the form and for your time!

**Appendix B**

**Fingerspelling and Number Receptive Pre-Test/Post-test (Answer Key)**

The purpose for this test is to aid the researcher in identifying your knowledge of fingerspelling and numbering as it relates to rules of use. This test will also look at your level of comprehension when receiving a message with finger spelled or numbered information.

This portion of the test will be completed on your computer. Please type your answer for the fill in the blank sections. Be sure to use the same number code (not your name) that you have received from your coordinator.

There will be two parts. The first part will focus on your receptive skills. The second part will focus on fingerspelling and numbering rules.

This test is confidential and will be destroyed at the end of the study. The results will not be shared with your DSP instructors and will not influence your standing in the program.

**Number code:** _____

Please be advised that you will only be allowed to watch the video once without the ability to rewind portions but you can pause the video to put down the answer. You are strongly encouraged to have a pen and paper ready to document finger spelled and numbered items from the video in order to fill in the blank sections in the test at the end of each section.

**Part one: Receptive Skills**

Write your answers down as best as you can. If you don't know any fingerspelling or numbering, please leave blank

**Video # 1: "Boat Accident"**

| | | |
|---|---|---|
| 1. #SMDI | 12. LAURIE | 23. DO |
| 2. #DO | 13. DANA | 24. ALL |
| 3. #KENORA | 14. Two (of them) | 25. 4 - 5 (times) |
| 4. One (week) | 15. 3rd | 26. 1st |
| 5. #DO | 16. SUSAN | 27. 2nd |
| 6. #DOCK | 17. Four (of us) | 28. 3rd |
| 7. #SAFEWAY | 18. Five (of us) | 29. 4th |
| 8. ½ (hour) | 19. WEATH (weather) | 30. ½ (hour) |
| 9. One (week) | 20. HAIL | 31. BACK |
| 10. One (hour) | 21. HAIL | |
| 11. Two (daughters) | 22. Two (daughters) | |

My friend Judith point through my work **#SMDI** what both of us **#DO++** teach for deaf children anyway you invite (us) go your camp in Ontario point where **#KENORA** Ontario. Invite me stay **one** week. Me go far out know **#DO++** me arrive car parking car park walk boat where on **#DOCK** near **#SAFEWAY** CL:C (Building) store point park+++ boat same equal car parking boat parking+++ me walk ride boat fantastic. boat point say maybe **½** hour boat arrive there camping there. Me stay **one** week rest do something. Judith say want go friend something there. Say boat maybe **one** hour boat fine++ arrange come my **two** daughters (name sign) L (in Z) and (name sign**)** D (in Z). **#LAURIE**, **#Dana**, **two** of them **third** my wife **#Susan** her sign SZ and me **four** of us, friend **five** of us join boat chat my friend chat my friend self drive talk++ me talk me talk. I wave smell weather **#WEATH** different smell wave maybe soon tornado my friend boat wave you silly you smell silly you boat. Me wave smell me look around true work beautiful blue sky change fast "" Black cloud over them my friend drive surprise you right drive wow tornado windy circle boat wave plus what **#HAIL** me wow hit my head cover my head **#HAIL** hit my head. My **two** daughters and my wife **#DO** under boat sit cover sit my friend boat fast me cover my head told you should my friend search where+++ boat spot point "" island cl: round point house you saw boat you walk down cliff wave come+++ wave come++ wait boat wave boat arrive boat tie run enter all wet **#ALL** wet you that island house you wow beautiful home house island house beautiful me look around you say you crazy you lightened tornado shake say my friend told point smell warning right answer woman man look really Judith told wave inform you smell right answer say+++ maybe **4 – 5** times inform me **first** not believe right **second** right, **third** right, **fourth** true work+++ smart smell wow boat wait **1/2** hour beautiful blue sky then invite us coffee cookie eat chat+++ my friend interpreting+++ chat++ ask++ chat good-bye thanks+++ finish boat go there friend house do something finish then **#BACK** boat arrive safe wow that's all.

**Video # 2: "Bad Luck"**

| | | |
|---|---|---|
| 1. #LUCK | 13. 13 (age) | 25. #JULY 18 |
| 2. 13 (age) | 14. 14 (age) | 26. #JULY 18 |
| 3. 18 (age) | 15. #AT | 27. 17 (age) |
| 4. 1st | 16. #COTTAGE | 28. #AT |
| 5. 13 (age) | 17. #SAND | 29. #COTTAGE |
| 6. #JULY 18 | 18. #CUT | 30. 18 (age) |
| 7. #AT | 19. #JULY 18 | 31. Two (of us) |
| 8. #COTTAGE | 20. 14 (age) | 32. 18 (age) |
| 9. Two (of us) | 21. 15 (age) | 33. #LUCK |
| 10. #BLOOD | 22. #JULY 18 | 34. 19 (age) |
| 11. #CUT | 23. 16 (age) | 35. 19 (age) |
| 12. 3 (stitches) | 24. Two (of us) | |

Now tell you story what title Bad **#LUCK** start **13** (age) to **18** (age)well, **first** **13** (age) on **#JULY 18** on Friday, I go swim **#AT** **#COTTAGE** point swim play water wave water wave with my sister **two** of us swim then my dad call supper come++ I fine++ call sister swim point you my sister swim far me swim happen metal know steep foot on steep cut feel on the foot feel soft well touch again **#BLOOD** on finger never mind swim ignore sister swim to my home inform dad point foot **#CUT** on foot dad must go hospital stitch **3** cute stitch **13** (age), **14** (age), me happen again **#AT** **#COTTAGE** me do something go bike fine bike wrong bike skid know "" not smooth "" dirt **#SAND** road bike skid **#CUT** scratch awful infection scratch on my birthday **#JULY 18**, **14** (age) well **15** (age) me happen me sick cold sick well **#JULY 18** next **16** (age) hold birthday hold why my dad **two** of us same birthday **#JULY 18** same **#JULY 18** but hold why my dad went workshop conference well hold **17** (age) well **#AT** **#COTTAGE** point again social wrong black become tornado on water not bad nothing next **18** (age) well my boyfriend this time **two** of us boyfriend flew Rome Olympic deaf Olympic stay me **18** (age) well bad **#LUCK** from to now **19** (age) **19** (age) normal finally hope next well hope will be fine.

**Video #3: "Photography"**

| | | |
|---|---|---|
| 1. #OK | 13. 4 (Deaf people) | 25. 8 (weeks) |
| 2. #PRARIE | 14. 5 (Deaf people) | 26. 2 (interpreters) |
| 3. #VIEW | 15. 10 (Deaf people) | 27. 3 (hours) |
| 4. 5 (years ago) | 16. 10 (Deaf people) | 28. 6 (pm) |
| 5. #NO | 17. 8 (Deaf people) | 29. 9 (pm) |

| | | |
|---|---|---|
| 6. #NO | 18. 2 (Deaf people) | 30. 10 (pm) |
| 7. #NO | 19. 10 (Deaf people) | 31. 3 (hours) |
| 8. 5 (years later) | 20. 8 (weeks) | 32. 8 (weeks) |
| 9. #WAY | 21. 3 (hours) | 33. #GRANT |
| 10. #GRANT | 22. 1st (time) | 34. #SO |
| 11. Two (of us) | 23. 3 (hours) | 35. #GRANT |
| 12. 3 (Deaf people) | 24. $265 | 36. #SO |

**#OK** wave me explain about recently how me take through **#PRAIRIE** **#VIEW** Photography you class in Winnipeg there that girl my friend girl want take this course maybe **5** years ago you but not able to why you take course but you can't because none interpreter who pay none limit accessible social government give money **#NO** **#NO** **#NO** well **5** years later until recently well you well join fight another again search find a way get money etc Fine sure true work long **#WAY** have to negation look like process **#GRANT** not funny money get woman help+++ fill out and need more Deaf people **two** , **three**, **four**, **five** that fine ask got **10** Deaf interest **10** Deaf people really **8** Deaf people and **two** (me and other) become **10** (Deaf people) together perfect well got money yeah for **8** weeks **three** hours every Tuesday perfect find teacher willing teach for Deaf **first** time scare go ahead yeah enter every Tuesday cost **3** hours **$265** course for each of us include interpreter Government pay interpreter really nice well anyway **8** weeks awesome well because Deaf together share feedback since Deaf none limit to ourselves keep good resource fancy good experience now share before I nothing nothing learn and teacher good with Deaf patient interact teach us easy perfect and interpreter **two** all of us interact **8** weeks too short feel so fast wow but **3** hours good every Tuesday **6 to 9 pm** something **10 pm** true work **3** hours well now understand **8** weeks finish recently spring finish well now next time must find another **#GRANT** **#SO** mean we work+++search for **#GRANT** hope government will pay for interpreter we will go more continue advance more class hope mean advance our improvement photography become future business and other hope **#SO** well

**Part 2: Fingerspelling and Numbering Rules: Please be sure to apply all answers to signing situations.**

1. Explain the correct hand position rules for fingerspelling.
   - Held approximately between the chin and shoulder level
   - Comfortable position; hand is not stiff
   - Palm orientation out most of the time, or slight turned toward non-dominant side
   - Don't bounce; keep steady

2. What are the general receptive rules for fingerspelling?
   - Make eye contact with the signer
   - Don't look at the signer's hand when they are fingerspelling
   - Be familiar with the hand shapes and movements

- When fingerspelling, keep in mind the context of the conversation
- Be familiar with general fingerspelling or numbering rules that will help with receptive skills

3. Please tell me the three main strategies for understanding fingerspelling, and give an example for each strategy.

   Context:
   - Use clues based on context such as categories, i.e. Fruits, or cars to narrow the word choice
   - Look for restrictive clues that such as colours of the rainbows or types of Nissan cars to narrow word possibilities.

   Configuration:
   - Look for the shape of the whole word rather than concentration on each letter.

   Closure:
   - Use clues such as the configuration of the word and the context of the conversation to help "piece" the word together.
   - Catch whatever letters one sees, then use the above clues.
   - Using closure allow you to "fill in the gaps," so it is not necessary to see every letter. This process also allows you to grasp the meaning, even when the signal is not clear or inaccurate.

4. When reading fingerspelling, where should you look?
   - Look at the signer's face, around the chin level
   - Never look at the signer's hand

5. What is another name for a 'loan sign' and please explain the rule of 'loan sign'?
   - Another word is Lexicalization
   - Letter deletion (#JAGUAR)
   - Location (A to B) (#BACK)
   - Movement (#STYLE)
   - Semantics (#BACK – Relationship on/off)
   - Reduplication (#HA, #DO)

6. Please explain how you know when to use fingerspelling?
   - Proper nouns (names of people, place, things)
   - Words (nouns) with no signs
   - Technical vocabulary
   - Specific nouns: "Carpet", "tool"
   - English words for which a sign has not been established
   - Emphasis
   - Clarification
   - When you don't know the sign

7. What is the rule for signing cardinal numbers (represent an amount or count)?
   - When counting, number 1 to 5 will have palm orientation toward the signer
   - For numbers 6 and beyond, palm orientation forward.

8. Explain what the rules are when signing a four-digit number?
   - Always be consistent in grouping numbers i.e. 2398 (23-98)
   - or individual number (2-3-9-8)

9. What is the rule for signing dates (include one of day, week or month)?

   - Day:
     - For 1 – 9, number incorporated into the sign for DAY.
     - For 10 or more, sign the number and then sign for DAY.
   - Week:
     - For 1 – 9, number incorporated into the sign for WEEK.
     - For 10 or more, sign the number and then sign for WEEK.
   - Month:
     - For 1 – 9, number incorporated into the sign for MONTH.
     - For 10 or more, sign the number and then sign for MONTH.

10. What is the rule when signing the score in sports?

    Scores are signed using the cardinal number rule (1 – 5 palm in toward your body)

    Home versus opposing team:
    - Sign the final score for a game, placing the score for the home team near your body and the score for the visiting team away from your body. The winning score is always signed first, regardless of which team is the home team.

    Neutral Teams:
    - If the teams are neutral, sign them out in neutral space, one on the right and one on the left side. Again, always sign the winning score first.

**Appendix C**

## Interview the instructors

### Background information

1. What is your first language?
2. Did anyone in your home use that language?
3. Educational background
    a. What level of education do you hold?
    b. What is your major or minor in relation to a university degree?

### Teaching experience

1. How many years have you been teaching?
2. How many courses have you taught and what kind of courses?
3. Do you work on a full time or part time basis?

### Fingerspelling and numbering

1. What kind of materials do you use for students to practice their fingerspelling and numbering skills?

2. What kind of tools do you use for students to practice their fingerspelling and numbering skills?

3. What have you noticed about DSP students' receptive skills with fingerspelling and numbering?
    a. Have you noticed that DSP students struggle in this area?
    b. Explain/describe what kind of struggles they have? Give me some examples.

4. What is your opinion regarding separate fingerspelling and numbering courses from ASL courses as opposed to an ASL course that encompasses everything.

5. Share your opinion regarding what you feel would be most beneficial for students to improve their receptive skills in fingerspelling and numbering?

    a. Do you have any specific teaching strategies regarding fingerspelling or numbering?
    b. Do you have any learning strategies for students to aid them while learning fingerspelling or numbering?
    c. Do you have any specific practice opportunities?
    d. Do you want to share any more of your experience related to teaching fingerspelling and numbering?

Appendix D



UNIVERSITY OF MANITOBA

Faculty of Education

**Department of Educational Administration, Foundations & Psychology**
230 Education Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

**Letter of Invitation – Students for pre-test and survey**

Hello Deaf Studies Program Students,

On behalf of Cheryle Broszeit, who is a graduate student at the University of Manitoba, I would like to invite you to participate in the research project she is completing for her M.Ed. The purpose of her research is to find out if the Fingerspelling and Numbering course taught separately from the American Sign Language course will benefit students to improve their receptive skills and gain more knowledge about fingerspelling and numbering rules. She is also interested in gathering this information to determine if the additional Fingerspelling and Numbering Course is essential for students and a worthwhile requirement of a Deaf Studies program.

Your participation in this study will involve completing an online survey and pre-test at the beginning of the semester (approximately 90 minutes of your time), and then a post-test at the end of the semester (approximately one hour). More specific details of the study are outlined in the letter being distributed, so please read this thoroughly before making your decision.

At this time, I would like to mention a few key points:

1. If you choose to participant in this study, you may refuse to answer any questions or withdraw from the study completely at any time without penalty.

2. The survey and tests that you complete as part of the study will not influence your standing in your courses in any way. In fact, you will not identify yourself by name on any of the forms and no instructors in the program will have access to the survey or test results. Even Cheryle Broszeit, as the researcher will not be able to link your test results to your name.

Thank you for your consideration of this request to participate in this research study. I will now leave the room, so that I will not know which of you decides to participate in the study. If you do decide to participate, please follow the instructions on the letter to access the survey and pre-test and use only the number code provided (not your name)

and place your signed letter in the envelope I have provided when you are finished. The last person to finish, please seal the envelope and leave it in the room. I will pick it up later and store it safely in my office until the time of the post-testing.

Thank you.

Appendix E

UNIVERSITY OF MANITOBA
Faculty of Education

**Department of Educational Administration, Foundations & Psychology**
230 Education Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

**Cover letter – Students for pre-test and survey**

**Number Code: 000**

**Name:** _____

Research Project Title: "**Exploring the Benefits of a Separate Course in ASL Fingerspelling and Numbering to Develop Students' Receptive Competency"**

Principal Investigator and contact information: Cheryle Broszeit (broszeic@myumanitoba.ca)

Research Supervisor and contact information: Dr. Charlotte Enns (204-474-9029 or Charlotte.Enns@umanitoba.ca)

**This letter should give you the basic idea of what the research is about and what your participation will involve. Please take the time to read this carefully and to understand any accompanying information.**

I am currently a graduate student in the Faculty of Education at the University of Manitoba. For my M.Ed. thesis, I will be completing the above-mentioned study. The purpose of my research is to find out if the Fingerspelling and Numbering course taught separately from the American Sign Language course will benefit students to improve their receptive skills and gain more knowledge about fingerspelling and numbering rules. I am also interested in gathering this information to determine if the additional Fingerspelling and Numbering Course is essential for students and a worthwhile requirement of the program.

Your participation in this study will involve completing a background survey and a test at the beginning of the semester (pre-test), and then again at the end of the semester (post-test). The survey information or results of the tests will not influence your standing in any of your courses in any way. In fact, the program coordinator and instructors will not have access to any of these measures. Both the pre-test and the post-test will take approximately one hour of your time while the survey will take approximately half an hour. All of these measures will be done outside of your regular school hours. All of the students participating in the study will do the tests and survey as one large group at the same time. The tests require the use of a computer with

encryption and data protection. The results will be stored in my computer that is set up with password protection.

In order to ensure anonymity and confidentiality, you will be assigned a number code (**please see the number at the top of this page**). You will enter this number (not your name) on all research forms. This will avoid any concern you may have of being identified; you will remain nameless during the analysis of the Fingerspelling and Numbering Receptive Test and survey. After completing the survey and pre-test, you will fill in your name on this letter (see above) and place it in the envelope provided. This envelope will be sealed and kept in a secure location until the time of the post-testing (end of the semester). This envelope will be opened and your letter returned to you in case you forget your number code for the post-testing. You will be asked to destroy this letter immediately upon completion of the post-test. No instructors, program coordinators, or students will have access to any of the students' test results, as these will be completed online and submitted directly to me. The test forms and surveys that I receive will be number coded so that I am not aware of any participants' names. After the publication of this thesis, the tests and survey used will be destroyed (by October 2015). Again, my advisor and I will be the only ones that have access to the tests and survey results, and your name and the name of your college will be kept anonymous and confidential in any written documentation.

If you choose to participant in this study, you may refuse to answer any questions or withdraw from the study completely at any time without penalty. Participating in this study will not affect your grades in the Deaf Studies Program. If you do not feel comfortable approaching me (because I am one of the instructors at the RRC Deaf Studies Program), you may contact Dr. Charlotte Enns to share your concerns or withdraw from the study. The nature of your concern will be shared with me, but I will not be told which student(s) has made these comments. It is important that you feel comfortable throughout this study.

Once I have completed my study, I will email a brief summary report to the coordinator of the program and the coordinator will then email it to all the students in the program regardless of whether or not they participated in the study.

The results of this study will be published as my M.Ed. thesis and also shared with other Deaf Studies Program across Canada. As well, the summary findings may be included in future scholarly presentations and publications, however, your name and the name of your college will be kept confidential. I believe that the results of this study will help Deaf Studies Programs determine the best programming for students and facilitate improved instruction for fingerspelling and numbering skills.

**Your completion of this survey implies your consent to participate in this study and that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence.**

**This research has been approved by the Education and Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact Cheryle Broszeit at broszeic@myumanitoba.ca or xxx-xxx-xxxx, Dr. Charlotte Enns at Charlotte.Enns@umanitoba.ca or 204-474-9017 or Margaret Bowman, the Human Ethics Coordinator (HEC) at 204-474-7122 or Margaret.bowman@umanitoba.ca .**

**If you are willing to participate in this study, please proceed to the survey at**
http://fluidsurveys.com/s/fingerspellingnumberingsurvey/

This survey is password protected. Please use XXXXX to access the survey.

**Upon completion of the survey please continue to**
http://fluidsurveys.com/s/fingerspellingnumberingpretest/ **for the pre-test.**

This test is password protected. Please use XXXXXX to access the test.

Please remember to enter **only the number code at the top of this letter** (not your name) on the research forms. When you have completed the survey and test, please write your name on this letter and place it in the envelope provided.

Thank you for your time and participation in my study.
Cheryle Broszeit

Appendix F

UNIVERSITY OF MANITOBA
Faculty of Education

**Department of Educational Administration, Foundations & Psychology**
230 Education Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

**Letter of Invitation – Students for post-test**

Hello Deaf Studies Program Students,

On behalf of Cheryle Broszeit, who is a graduate student at the University of Manitoba, I would like to invite those of you who completed the pre-test for her study at the beginning of the study to now complete the post-test. As you recall, the purpose of her research is to find out if the Fingerspelling and Numbering course taught separately from the American Sign Language course will benefit students to improve their receptive skills and gain more knowledge about fingerspelling and numbering rules.

Your ongoing participation in this study will involve completing the online post-test at the end of the semester (approximately one hour). More specific details of the study are outlined in the letter being distributed, so please read this thoroughly before making your decision.

At this time, I would like to mention a few key points:

1. If you choose to participant in this study, you may refuse to answer any questions or withdraw from the study completely at any time without penalty.

2. The survey and tests that you complete as part of the study will not influence your standing in your courses in any way. In fact, you will not identify yourself by name on any of the forms and no instructors in the program will have access to the survey or test results. Even Cheryle Broszeit, as the researcher will not be able to link your test results to your name.

Thank you for your consideration of this request for ongoing participation in this research study. I will now leave the room, so that I will not know which of you decided to continue your participation in the study. If you do decide to continue to participate, please follow the instructions on the letter to access the online post-test and use only the number code provided (not your name) at the beginning of the semester. If you do not remember

your number, you can retrieve your letter from this sealed envelope. You should destroy your letter linking your name and number code immediately upon completion of the post-test.

Thank you.

Appendix G



UNIVERSITY OF MANITOBA

Faculty of Education

**Department of Educational Administration, Foundations & Psychology**
230 Education Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

**Cover letter – Students for post-test**

Research Project Title: "**Exploring the Benefits of a Separate Course in ASL Fingerspelling and Numbering to Develop Students' Receptive Competency"**

Principal Investigator and contact information: Cheryle Broszeit (broszeic@myumanitoba.ca)

Research Supervisor and contact information: Dr. Charlotte Enns (204-474-9029 or Charlotte. Enns@umanitoba.ca)

**This letter should give you the basic idea of what the research is about and what your participation will involve. Please take the time to read this carefully and to understand any accompanying information.**

I am currently a graduate student in the Faculty of Education at the University of Manitoba. For my M.Ed. thesis, I will be completing the above-mentioned study. The purpose of my research is to find out if the Fingerspelling and Numbering course taught separately from the American Sign Language course will benefit students to improve their receptive skills and gain more knowledge about fingerspelling and numbering rules. I am also interested in gathering this information to determine if the additional Fingerspelling and Numbering Course is essential for students and a worthwhile requirement of the program.

Your continued participation in this study will involve completing the post-test at the end of the semester. The results of the test will not influence your standing in any of your courses in any way. In fact, the program coordinator and instructors will not have access to any of these measures. The post-test will take approximately one hour of your time and will be done outside of your regular school hours. All of the students participating in the study will do the post-test as one large group at the same time. The test requires the use of a computer with encryption and data protection. The results will be stored in my computer that is set up with password protection.

In order to ensure anonymity and confidentiality, you were assigned a number code for the pre-test. You will enter this number (not your name) on the post-test form as well. If you do not remember your number code, you may retrieve you initial letter from the sealed envelope provided. You will be asked to destroy the letter linking your name and number code immediately upon completion of the post-test. No instructors, program coordinators, or students will have access to any of the students' test results, as these will be completed online and submitted directly to me. The test forms and surveys that I receive will be number coded so that I am not aware of any participants' names. After the publication of this thesis, the tests and survey used will be

destroyed (by October 2015). Again, my advisor and I will be the only ones that have access to the tests and survey results, and your name and the name of your college will be kept anonymous and confidential in any written documentation.

If you choose to participant in this study, you may refuse to answer any questions or withdraw from the study completely at any time without penalty. Participating in this study will not affect your grades in the Deaf Studies Program. If you do not feel comfortable approaching me (because I am one of the instructors at the RRC Deaf Studies Program), you may contact Dr. Charlotte Enns to share your concerns or withdraw from the study. The nature of your concern will be shared with me, but I will not be told which student(s) has made these comments. It is important that you feel comfortable throughout this study.

Once I have completed my study, I will email a brief summary report to the coordinator of the program and the coordinator will then email it to all the students in the program regardless of whether or not they participated in the study.

The results of this study will be published as my M.Ed. thesis and also shared with other Deaf Studies Program across Canada. As well, the summary findings may be included in future scholarly presentations and publications, however, your name and the name of your college will be kept confidential. I believe that the results of this study will help Deaf Studies Programs determine the best programming for students and facilitate improved instruction for fingerspelling and numbering skills.

**Your completion of this post-test implies your consent to ongoing participation in this study and that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence.**

**This research has been approved by the Education and Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact Cheryle Broszeit at broszeic@myumanitoba.ca or xxx-xxx-xxxx, Dr. Charlotte Enns at Charlotte.Enns@umanitoba.ca or 204-474-9017 or Margaret Bowman, the Human Ethics Coordinator (HEC) at 204-474-7122 or Margaret.bowman@umanitoba.ca .**

**If you are willing to continue to participate in this study, please proceed to the post-test at**
**http://fluidsurveys.com/s/fingerspellingandnumberingposttest/**

This test is password protected. Please use **XXXX** to access the test.

Please remember to **enter only the number code** (not your name) on the test form.
Please destroy the letter linking your name and number code immediately upon completion of the post-test.

Thank you for your time and participation in my study.

Cheryle Broszeit

Appendix H

UNIVERSITY OF MANITOBA
Faculty of Education

**Department of Educational Administration, Foundations & Psychology**
230 Education Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

**Letter of Invitation – Instructors**

**January 2015**

**Subject: Research Project Participation**

**Attachment: Consent Form - Instructors**

I am currently a graduate student in the Faculty of Education at the University of Manitoba. For my M.Ed. thesis, I will be completing a study to find out if the Fingerspelling and Numbering course taught separately from the American Sign Language course will benefit students to improve their receptive skills and gain more knowledge about fingerspelling and numbering rules. I am also interested in gathering this information to determine if the additional Fingerspelling and Numbering Course is essential for students and a worthwhile requirement of a Deaf Studies program.

I would like to invite you to participate in my study. I would like to interview you, either by videoconference or in person, and ask you about your teaching methods, materials and strategies. The interview will take approximately one hour of your time and will be arranged at a time and place that is convenient for you. The interview will be recorded by video; however only my advisor and I will have access to this recording. After the interview, you will have an opportunity to review the transcription. Your name, information regarding your background, teaching experience any other identifying information will not be included anywhere in this study. Upon the completion of the study (by October 2015), the video and all written documentation will be destroyed. Please read the attached Consent Form that outlines more specific details of the process, including the risks and benefits. You should know that if you choose to participant in this study, you may refuse to answer any questions or withdraw from the study completely at any time without penalty.

If you have any questions or concerns, or if you are interested in participating in this study, please feel free to contact me by replying to this message (broszeic@myumanitoba.ca).

Thank you for your consideration of this request.

Sincerely,

Cheryle Broszeit

Appendix I



UNIVERSITY OF MANITOBA

Faculty of Education

**Department of Educational Administration, Foundations & Psychology**
230 Education Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

**Consent Form – Instructors**

Research Project Title: "**Exploring the Benefits of a Separate Course in ASL Fingerspelling and Numbering to Develop Students' Receptive Competency"**

Principal Investigator and contact information: Cheryle Broszeit (broszeic@myumanitoba.ca)

Research Supervisor and contact information: Dr. Charlotte Enns (**204-474-9017** or Charlotte. Enns@umanitoba.ca)

**This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, feel free to ask. Please take the time to read this carefully and to understand any accompanying information.**

I am currently a graduate student in the Faculty of Education at the University of Manitoba. For my M.Ed. thesis, I will be completing the above-mentioned study. The purpose of my research is to find out if the Fingerspelling and Numbering course taught separately from the American Sign Language course will benefit students to improve their receptive skills and gain more knowledge about fingerspelling and numbering rules. I am also interested in gathering this information to determine if the additional Fingerspelling and Numbering Course is essential for students and a worthwhile requirement of the program.

Your participation in this study is voluntary. You will be involved in a videoconference or in-person interview with me at the end of the first semester. I will ask you some background information and questions about your teaching methods, materials and strategies. The interview will take approximately one hour of your time and will be arranged at a time and place that is convenient for you. The interview will be recorded by video; however only my advisor and I will have access to this recording. After the

interview, you will have an opportunity to review the transcription. Your name, information regarding your background, teaching experience any other identifying information will not be included anywhere in this study. Upon the completion of the study (by October 2015), the video and all written documentation will be destroyed. The expected risks for the instructors, should they choose to participate, will be that of maintaining anonymity amongst their colleagues. Because there are very few individuals employed in Deaf Studies programs, individuals may be easily identified. Extra care to reduce the risk of identifying RRC participants will be taken as I am not only the person to conduct the interviews, but also an instructor and colleague at RRC. In order to reduce this risk, the instructors will send their consent forms directly to me without each other's knowledge. No interviews will be held at RRC or during work hours to ensure confidentially amongst staff. The interview questions asked regarding background information and teaching experience will not be included in the paper. The focus will be on fingerspelling and numbering curriculum and tools. Also the collected data will be compiled as general statements from all instructors and coordinators in one piece of information.

A sample of the questions that will be asked in the interviews with instructors and are as follows:

1. What kind of materials do you use when practicing fingerspelling and numbering skills with your students?

2. What have you noticed about DSP students' receptive skills with fingerspelling and numbering?

3. Do you have any learning strategies for students to aid them while learning fingerspelling and numbering?

If you choose to participant in this study, you may refuse to answer any questions or withdraw from the study completely at any time without penalty. If you withdraw, the data collected from you will be destroyed. You can simply inform me of any concerns or your intention to withdraw. It is important that you feel comfortable throughout the study.

Once I have completed my study, a brief summary report will be available for you by email. Please indicate if you are interested in receiving this information by completing the section at the end of this form.

The results of this study will be published as my M.Ed. thesis and also shared with other Deaf Studies Program across Canada. The summary findings may be included in scholarly presentations and publications in the future; however, your name and the name of your college will be kept confidential. I believe that the results of this study will help Deaf Studies Programs determine the best programming for students and facilitate improved instruction for fingerspelling and numbering skills.

Your signature on this form indicates that you have understood to your

satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

**This research has been approved by the Education and Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact Cheryle Broszeit at broszeic@myumanitoba.ca or xxx-xxx-xxxx, Dr. Charlotte Enns at Charlotte.Enns@umanitoba.ca or 204-474-9017 or Margaret Bowman, the Human Ethics Coordinator (HEC) at 204-474-7122 or Margaret.bowman@umanitoba.ca . A copy of this consent form has been given to you to keep for your records and reference.**

Participant's Signature: _____ Date: _____

Researcher and/or Delegate's Signature: _____ Date: _____

___ I would like to receive a summary report of this study when it is completed. Please send it to the following address/email:

_____

Appendix J

# Ethical Approval

UNIVERSITY OF MANITOBA | Research Ethics and Compliance
Office of the Vice-President (Research and International)

Human Ethics
208-194 Dafoe Road
Winnipeg, MB
Canada R3T 2N2
Phone +204-474-7122
Fax +204-269-7173

**APPROVAL CERTIFICATE**

October 8, 2014

**TO:** **Cheryl Broszeit** (Advisor C. Enns)
Principal Investigator

**FROM:** **Lorna Guse, Chair**
Education/Nursing Research Ethics Board (ENREB)

**Re:** **Protocol #E2014:113**
**"Exploring the Benefits of a Separate Course in ASL Fingerspelling and Numbering to Develop Student's Receptive Competency"**

Please be advised that your above-referenced protocol has received human ethics approval by the **Education/Nursing Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement (2). **This approval is valid for one year only**.

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

**Please note:**

- **If you have funds pending human ethics approval, please mail/e-mail/fax (261-0325) a copy of this Approval (identifying the related UM Project Number) to the Research Grants Officer in ORS in order to initiate fund setup. (How to find your UM Project Number: http://umanitoba.ca/research/ors/mrt-faq.html#pr0)**

- **if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.**

The Research Quality Management Office may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

**The Research Ethics Board requests a final report for your study (**available at: http://umanitoba.ca/research/orec/ethics/human_ethics_REB_forms_guidelines.html**) in order to be in compliance with Tri-Council Guidelines.**