Teaching Sight Words to Students with ID

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Dedication

I dedicate this project to my mother, Russann Heinrich, who instilled in me a love of education, a sense of self-worth and a desire to always do my best with whatever I may be faced with. Without her influence and guidance I would have never been able to see my way through this program. I would like to thank my son, Nathan, who has given me a reason to pursue my education to make his life better, even when I have been faced with adversity. Thank you to my granddaughter, Camie, who continues to show her love of life and learning everyday of her life. She helps keep me grounded and in touch with my dreams and aspirations. Finally I would like to thank my cohort, as well as my partner in this research, and the faculty at Maryville University for kindly giving their time and effort in helping me achieve my goal in finishing this program.

Abstract

This research study asks how working memory and processing speed play into the acquisition of functional sight words for students with an intellectual disability in one school district. The study also compared a computer aided instructional program, n2y, to a more visual program with images embedded within the word, SnapWords, to try and determine which program worked best to teach these students. By using a mixed method approach the study seeks to answer the questions of working memory and processing speed playing into the acquisition of functional sight words as well as which program, n2y or SnapWords, helps the students acquire more words. While the study shed much light on working memory and processing speed playing no significant role in acquiring sight words, it also helped assess that SnapWords is a more effective method in teaching sight words than the n2y program. The value shown between both programs calls for further study on how to best meet the needs of teaching reading to students with ID.

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Chapter One: Introduction

Reading is one of the most fundamental skills that everyone needs to learn to get around in their world. They need to know how to read which bathroom to use while in public and hot and cold to know which faucet to use.

If you are in a building, and there is a fire you need to know how to read the exit signs and know that you cannot get into an elevator in case of fire. When taking medication, you need to know how to read the label to know how many pills to take and when to take them. In an emergency, you need to know how to read the road signs and know that the big blue square with an H in the middle is for the hospital.

Teachers have a very important job in teaching their students to read, and this is extremely important for the students in an essential skills classroom. Essential skills classrooms are comprised of students that have an intellectual disability, which is a full-scale IQ score of 70 or below. Students that are in an essential skills classroom need to learn how to read functional words so they will be able to navigate the world in which they live. Functional sight words are commonly used *words* that young children are encouraged to memorize as a whole by *sight* so that they can automatically recognize these *words* in print without having to use any strategies to decode. “Believe it or not, 50% of all reading texts are made up of the same 100 words! The most frequently used and repeated words in the English language are known as sight words” (Smith, 2015).

Teachers in essential skills classrooms face an uphill battle helping the children to learn to read in the first place let alone a lot of the functional words they will have to know. Reading is a complex task which makes it more difficult for students with an intellectual disability (ID) (Alnahdi, 2015). Without preparing these students to read words that will help them in their everyday life, we are certainly doing a disservice to these children and not getting them ready to live independently as much as they may be capable of being. Many of the students with the full-scale IQ's closer to the 70 range would be able to live in a group home or perhaps independently with a case worker to help them with managing money, getting to work, cooking food, etc. However, without the ability to read functional sight words on signs, it would likely be impossible for them to be safely on their own in any capacity.

Presentation of the Problem

Public schools have the obligation to teach students from every walk of life as well as every ability level. Far too often special education teachers have to take the curriculum that the district has adopted and modify and adjust it to use with the students in the special education classrooms. At times, it is because the district does not have enough money to buy the necessary curriculum materials to teach students that are in the essential skills classrooms and at other times the district is not considering the population of students in the essential skills classroom. Statistically, there is only about 2.2% of the population that fall within

the ID range of cognitive functioning. Nowhere is this more evident than in the essential skills classrooms. It is very difficult and at times impossible to revise curriculum that was written for the regular education classrooms that can, in turn, be used in the essential skills classrooms.

Students that are in the essential skills classrooms learn at a considerably slower rate than same age peers and need more strategies and interventions than regular education students. Students with an intellectual disability need repetition of the same skill on a daily basis sometimes for days, weeks or even months in order to learn the skill. There are some skills that they might not learn even after years of trying despite the teacher's and students best effort.

Due to special education classroom teachers having to create their curriculum using what was devised for the typical learner, the curriculum within the same district is not consistent due to the varying abilities of teachers to adapt curriculum. When new curriculum is introduced into a school district, the regular education teachers get training and get to collaborate within the grade or subject level. Special education teachers even from the same school at times do not have this opportunity. As special education teachers working in the Wentzville School District (WSD), it is very difficult to feel like you are connected to other schools within the district. It is difficult at times to even feel connected to the same school.

Teaching students with ID to read functional words is a very difficult feat and takes a tremendous amount of time. Once they learn to read the words

generalizing them is yet another issue. “Limited reading ability hinders the student from having a normal standard of life, and that can be a great disadvantage to them in finding vocational opportunities, for instance” (Alnahdi, 2015). Teaching students with an intellectual disability functional words vary from school to school within the WSD. So if a student that is in the essential skills classroom moves to another school within our district, it would likely be that the teacher of the essential skills classroom would be teaching to a different curriculum as there is no opportunity to gather and make the curriculum consistent across our schools. The students in essential skills classrooms within the WSD should have the same opportunity as the general education students to have a consistent curriculum across the entire district.

History of the Problem

Because of P.L. 94-142, enacted in 1975, every student with a disability of any kind was guaranteed a free and appropriate education:

> This law provided that handicapped children and adults ages 3-21 be educated in the "least restrictive environment" to the maximum extent appropriate, meaning that they are educated with children who are not handicapped and that special classes, separate schools, or other removal of children from their regular educational environment occurs only when the severity of the handicap is such that education in regular classes cannot be achieved (Public Law 94-142).

Before the enactment of PL 94-142 students with disabilities and specifically ID were by and large placed in institutions where the fate of many individuals was likely to be dim. "In 1967, state institutions were homes for almost 200,000 persons with specific disabilities" (U.S. Department of Education, 2007). Too often, persons with disabilities were merely accommodated rather than assessed, educated and rehabilitated.

Local Perspective

There are nine elementary schools in the WSD and in each of those schools, the students with intellectual disabilities are taught using different curriculum developed, modified or adapted by each teacher in those classrooms. The curriculum is not consistent throughout the schools nor are the special education teachers given an opportunity to collaborate with each other regarding the curriculum, resources, and strategies being used by each of them.

Regular education teachers are given an opportunity to get together as grade levels in all of the elementary schools to collaborate about the curriculum, students, and different strategies that each of them finds helpful. They are given the chance to enhance their curriculum, help colleagues with particularly difficult students, and even give suggestions on ways to improve upon their teaching methods. Students that are in special education classrooms deserve nothing less than what the other students in the school receive.

In the 2014-2015 school year, WSD adopted the online program *n2y*, a cloud-based learning program, which is designed to be used in the essential skills classrooms. n2*y* is a special education curriculum that contains lesson plans and materials needed for varying subjects so the essential skills teachers can teach rather than modify curriculum (n2y, 2016).

Unfortunately, WSD has never formally trained the essential skills teachers on how to use this program but were given the directive from the process coordinators to use it exclusively in their classrooms, despite having no training on the correct use of the program. Of the nine essential skills classrooms, not one of them uses this program to the exclusion of all of the other materials they have accumulated through their years of teaching. The fault in the program is that it is not modified low enough for many of the students in the essential skills classrooms.

Two essential skills classrooms use SnapWords to teach functional sight words. SnapWords are different than the usual visual cards with the picture next to the functional sight word. SnapWords have the picture embedded within the word; thereby, making it easier for the students with ID to learn how to read. SnapWords have images that are embedded in each word that helps children learn words as easily as a camera snapping a picture. An example of a snap word would be, *fly* that has the embedded picture of an airplane on the letter f and a rocket on the letter l. Usually, students with ID need many different

avenues and approaches to learning the same material as regular education students.

Research Question

How do working memory and processing speed index scores relate to functional sight word acquisition for students in essential skills classrooms? Which of the two programs that WSD currently has access to, is the better way to teach functional sight words?

Summary

While the necessity of students with ID learning to read functional sight words in order to live and survive in society today, the question is how we teach them in the best possible way. Many researchers offer the history of teaching students with ID (Browder, et al., 2014; Coleman, et al., 2012); why do students with ID need to learn to read functional sight words (Coleman, et al., 2012; Mahlburg, 2013); and what role working memory and processing speed plays in the acquisition of sight words (Poloczek et al., 2012; Trezise, et al., 2014; Mangen, R., 2015).

Definitions

Intellectual disability formerly labeled “mental retardation,” is defined by the Individuals with Disabilities Education Act (IDEA) as “significantly subaverage general intellectual functioning, existing concurrently [at the same time] with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child’s educational performance.” There are two key components of this definition: a student’s IQ and his/her capability to function independently, usually referred to as adaptive behavior (Cornoldi, et al., 2014; Holdnack, 2003).

Free Appropriate Public Education (FAPE) a free appropriate public education must be available to all children residing in the State between the ages of 3 and 21, inclusive, including children with disabilities who have been suspended or expelled from school, as provided for in Sec. 300.530(d) (Building the Legacy).

Essential skills classroom is comprised of students with an intellectual disability. The students in these classrooms are largely self-contained throughout most of their day with the exception of physical education, art, music, computers, library, recess and lunch. These students work on adaptive skills such as effectively communicating their wants and needs, taking care of themselves, and skills needed for everyday living.

P.L. 94-142 guaranteed a free appropriate public education to each child with a disability. This law had a dramatic, positive impact on millions of children

with disabilities in every state and each local community across the country (Public Law 94-142).

Functional words are words that are needed to survive at the lowest level of functioning ex. Fire escape, restrooms, as well as having he ability to read and take prescriptions as needed.

Least restrictive environment (LRE) is the requirement in federal law that students with disabilities receive their education, to the maximum extent appropriate, with nondisabled peers and, that special education students are not removed from regular classes unless, even with supplemental aids and services, education in regular classes cannot be achieved satisfactorily (Special Education Right and Responsibilities).

n2y is effective symbol-supported tools and materials for students with special needs. *n2y* develops the special education curriculum, lesson plans, and materials so teachers can spend their time teaching.

SnapWord Cards each word is embedded in a visual rather than having a visual next to the word. This has been equated to taking a snapshot with a camera, thereby, leaving an image of a photo in your mind, rather than just letters that many times do not make sense to students with an Intellectual Disability.

Chapter Two: Review of the Literature

"Individuals with moderate and severe developmental disabilities have been offered some of the most rapidly evolving educational services since students with disabilities were first guaranteed a free appropriate public education (FAPE) in 1975 (under PL 94-142)" (Browder, et al., 2014, p. 6). "Today's interpretation of FAPE differs greatly from that of 1975 when the Education for All Handicapped Children Act (EHA) initially was passed into law and even from 1990 when the reauthorization of EHA changed the name to the Individuals with Disabilities Education Act (IDEA)". (McGrew & Evans, 2004, p. 2) As stated by Browder, "Although schools were not required to provide services prior to the 1970's, schools now must be accountable for ensuring that all students, including those with severe disabilities, make adequate yearly progress. Research on how to teach students with intellectual disabilities has rapidly evolved in the past 40 years". (Browder et al., 2014, p. 6)

You may ask yourself, why is it important for students with an intellectual disability (ID) learn how to read? There are, after all, books on tape, computer software that reads the text, advanced spell and grammar check on computers, talking calculators, speech recognition software, and a host of other assistive technology (National Center for Education Statistics, 2013). "Literacy opens doors to independence and employment that is not open to other modalities for individuals with ID. Often, however, individuals with moderate and severe ID are

faced with disadvantages with regard to acquiring literacy skills". (Coleman, et al., 2012, p. 280)

Across America, there are approximately 14% of adults who have below basic literacy skills. This in essence means they are unable to perform simple daily tasks that require reading. One's quality of life will be affected when they have limited reading ability (National Center for Education Statistics, 2013). "The lack of one's functional literacy or the ability to read greatly limits communicative tasks necessary to perform daily routines and may provide an individual with ID the lack of ability to have control over choices in his/her life". (Coleman et al., 2012, p. 280)

Teaching Students with ID to Read

"In order to teach students with ID it is noted that they need to have explicit, consistent, and comprehensive reading instruction for a long period of time to learn basic reading skills". (Alnahdi, 2015; Goldstein, 2011; and Erickson, et al., 2009). According to Alnahdi (2015), learning to read is a complex task which makes it even more difficult for students with ID. More important to note is that limited reading ability hinders the student from having a normal standard of life and can even be a major disadvantage in finding vocational as well as other opportunities after they graduate from high school (Alnahdi, 2015; Collins, et al., 2007; Ruppar, et al., 2015). Research has shown that students with ID can and

do learn to read in a multitude of different ways (Ruppar et al., 2015; & Mahlburg, 2013).

Current curriculum development efforts and legislative impetus have placed the teaching of literacy skills to all students, including students with ID. For years, many educators thought that students with ID were not capable of learning to read (Alberto, et al., 2013; & Alnahdi, 2015). In reviewing the literature, four significant studies have suggested otherwise (Alberto, et al., 2010; Browder, et al., 2014; Mahlburg, 2013; Alnahdi, 2015).

Mahlburg (2013) questioned whether a functional curriculum for students with ID helps them read with comprehension or understanding. "Teachers of students with ID and visual impairments completed a survey that found that although most teachers were interested in learning more about literacy, fewer than half of the teachers felt that reading or literacy instruction was important for all students, even if they do not all become literate". (Mahlburg, 2013, p. 5)

What Role Does IQ Play in Helping Students with ID Learn to Read?

What is meant by Intelligence Quotient (IQ) and why do we need to know a student's IQ? IQ in the broadest sense of the word means how well a person can learn, understand, remember, and problem solve, compared with other people of the same age, in the same culture, and who have had the same opportunities (Foreman, 2009; Holdnack, 2003). Our concept of intelligence has

evolved over time, and intelligence tests have evolved along with it. Researchers continually seek ways to measure intelligence more accurately (History of Intelligence Testing, 2016).

The assessment or measurement of intelligence has always been a controversial issue. Alfred Binet, a French psychologist, & Theodore Simon, a collaborator, developed the first psychological scale to measure intelligence in the very early part of the 20th century. Stanford University psychologist, Lewis Terman, published the first Stanford-Binet in 1916 based on Binet and Simon's principles. In 1937, another edition of the Stanford-Binet was published by Terman in association with another Stanford psychologist, Maud Merrill. Millions of children had their intelligence tested with the Stanford-Binet and for many their lives were determined by this assessment (Foreman, 2009).

Regardless of how intelligence is measured, there will be some people whose ability to learn, remember, understand, and solve problems is significantly impaired. It could indicate that these people have an *intellectual disability.* Recent analysis has shown that all definitions for ID over the last 50 years have contained three important components: (1) intellectual limitation, (2) limitations in adapting to environmental demands, and (3) early age of onset during the developmental period. "The current (2002) definition is that ID [mental retardation] is a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual,

social, and practical adaptive skills. This disability originates before age 18". (Foreman, 2009, p. 4)

The reason that we need to measure intelligence is usually for one or a combination of three purposes: diagnosis, classification, or identification of support needs (Foreman, 2009). The Missouri Division of Special Education Compliance Standards & Indicators states the eligibility criteria for Mental Retardation/Intellectual Disability is that a child performs 2.0 standard deviations (SD) below peers, they must have adaptive behavior that is consistent with cognitive abilities, and reduced cognitive ability and adaptive behavior adversely affecting educational performance (Special Education, 2015). A Full-Scale (FS) IQ score of 70 or below must be achieved in order to consider a child within a school setting has an intellectual disability.

What Role Does Working Memory Play into Learning to Read

What is meant by the term Working Memory (WM) and how does WM play into the acquisition of functional sight words and learning to read? On an intelligence test, researchers have hypothesized that the WM system, which is the ability to temporarily hold information in conscious awareness with the intent to use that information to solve an immediate problem, and to the development of reading (Holdnack & Alloway, 2010; Poloczek, et al., 2012; Orsolini, et al., 2015; Van der Molen, et al. 2014; Trezise, et al., 2014). Children often identified as poor readers display deficits in auditory WM and phonological short-term

memory. WM is very important to become a proficient reader. There is extensive evidence that WM measures are linked to reading, writing, and mathematics in typically developing children (TDC) (Van der Molen et al., 2014). “The academic skills of children with ID are often the same level as the skills of TDC during their beginning elementary years; however, as they grow and mature the gap of ability and academics of the students with ID becomes more pronounced than TDC”. (Poloczek et al., 2012, p.22) Because WM measures are linked to basic academic skill development, the WM impairments of children with ID are likely to contribute to their difficulties in learning to read, write, and calculate (Poloczek et al., 2012).

A number of studies show a high correlation between WM capacities and measures of learning and academic achievement (Alloway & Passolunghi, 2011; Swanson & Alloway, 2012; Alloway, et al., 2013). “Most studies assessing WM in children with ID analyzed their performance using age-expected norms and found deficits in all of the subcomponents of WM”. (Orsolini et al., 2015, p. 8) Reading ability (rate, accuracy, and comprehension) has been shown to predict performance on a verbal WM task (Trezise et al., 2014). Scores on WM tasks can and do at times predict reading achievement in students with ID (Alloway, 2010).

What Role Does Processing Speed Play in Learning to Read

What is Processing Speed (PS) and how does it affect the acquisition of functional sight words in students with ID? "PS assesses the abilities to focus attention and quickly scan, discriminate between, and sequentially order visual information. It requires persistence and planning ability, but is sensitive to motivation, difficulty working under a time pressure, and motor coordination". (Butnik, 2013, p.1) Mangen (2015) stated that "Processing speed has been compared to a valve in a water pipe. The rate with which water flows through the pipe is increased when the valve is open wide, and decreased when the valve is partially closed. Slow processing speed is like having a partially closed valve in that water pipe". (p. 2)

PS has nothing to do with how smart a child is; it has more to do with how quickly a person can process information, make sense of it, and perform some task related to PS (Butnik, 2013; Kelly, 2015; & Jacobson, et al., 2012). PS deficits can and do affect reading even if the students know how to recognize and decode words (Jacobson, et al., 2012; Braaten, 2014). For example, when a student is reading the word "school" it may not be immediately known. They have to figure out what strategy helps them to understand and connect meaning to the group of letters. The student lacks atomicity in reading the word. However, it does not mean the student cannot read. Reading the word takes a longer time to process and is more difficult than peers their age and requires more effort for them (Kelly, 2015; Everly & Ganim, 2014).

When someone asks, is there any way to fix a slow PS the short answer to that would be that it is not known how to fix it at the present time (Braaten, 2014). Boys have a significantly higher chance of having a slower PS than girls. Classrooms have been arguably structured to favor girls which then gives the boys an even greater challenge in the classroom and most teachers do not know or recognize this (Braaten, 2014; Evely, et al., 2014). PS plays a role in many other areas of one's life than just reading. PS does affect all learning activities, social functioning, and the student may develop poor self-esteem. Eventually, they are at risk of dropping out of school because it becomes much too demanding for them to keep up with peers (Evely et al. 2014; Kelly, 2015; Braaten, 2014).

The Essential Role of Functional Sight Words and Connected Text in Reading Instruction for Students with ID

Teaching students with ID to read has only been brought to the forefront in recent years; prior to the authorization of IDEA, reading was not seen as something important to teach students with ID, and more importantly, it was thought that these students were unable to learn to read (Goldstein, 2011; Hansen, et al., 2014; McGrew et al. 2004; Ruppar et al., 2014). Teachers make choices about how students with severe disabilities are taught and educated which will have far reaching implications for these students' lives long after they graduate high school (Ruppar et al., 2014).

According to Alberto (2010), “The predominant form of reading instruction for students with ID is sight-word instruction, and the primary characteristic of sight-word instruction is that students are taught to memorize individual words”. (p. 1467) Many times the missing link is the extension from reading individual words to reading the simple connected text which should be included as a basic element of early literacy instruction (Goldstein, 2011; Collins, 2007). Students with ID encounter connected text in two primary contexts: environmental connected text and leisure connected text. It is critical that the students with ID learn to read environmental connected text because it provides access to important directions (e.g., safety information, microwave cooking instructions, as well as useful environmental information (e.g., what is on sale in the store; where the bus stop is located) (Alnahdi, 2015; Alberto, et al., 2013).

When students with ID are learning to read connected text it is important when trying to convey complete thoughts when acquiring information from a newspaper (e.g., rain today), comic books, and accessing pleasure reading in primers (Alberto et al., 2010; Alberto et al., 2013; Burns, 2007; Coleman, Cherry, Moore, Park & Cihak, 2015). According to Alberto et al. (2010), the discussion of connected text in the professional literature is limited and lacks data-based research. Typically when speaking of connected text, it is in relation to phonics instruction or elements of print awareness. Teaching functional sight-words depends greatly on memory and therefore when selecting words to teach they

should be functional and frequently appear in the students' environment (Alberto, 2013; Alberto, 2010; Alnahdi, 2015).

Teaching students with ID to read requires on-going, intensive instruction over an extended period of time (Allor, et al., 2010; Alnahdi, 2015; Goldstein, 2011). Allor et al., (2010), reported that "students with ID require large amounts of repetition to make meaningful progress". (p. 500)

There is limited data-based research on teaching functional sight words to students with ID in the natural environment which does not allow students the ability to access information from their environment. Therefore, in order to achieve this goal, reading instruction needs to happen for a longer time than same-age peers (Alberto et al., 2013; Allor et al., 2010; Coleman et al., 2015). Research on adapting reading materials for teaching students with ID to read is in its infancy, as there is much more research happening with older students and young adults; therefore, more research is needed with younger students in order to determine and ensure that an appropriate foundation is laid for all students with disabilities (Goldstein, 2011; Allor, et al., 2010; Collins, et al., 2007).

Computer-assisted instruction. Reading and writing are key components needed to navigate through life effectively for accessing other subject matter (Benitez & Domeniconi, 2016). Computer-assisted instruction (CAI) helps engage students with ID because it can provide visual, auditory, images, colors, animation, elements of interactivity, and time on task (Mechling,

et al., 2007; Wakeman, et al., 2013). CAI is a relatively new approach to instruction for students with ID; however, it is becoming more prevalent due to its effective academic outcomes (Coleman, et al., 2015; Browder, et al., 2014).

CAI helps in the acquisition of sight words and has been found to be very effective for students with ID due to the varying degrees of interactivity involved (Coleman et al., 2012; Mechling et al., 2007; Coleman et al., 2015). Browder (2014) stated that CAI is associated with a moderate level of evidence in teaching skills to students with severe disabilities. As stated by Yaw and colleagues (2016), when CAI is used the students make more immediate and rapid gains. When using CAI teaching can occur in a more naturalistic environment such as the inside of a building and the students finding the fire escape (Browder et al., 2014).

Although technology is becoming more widely used with the arrival of iPads, iPods, SMART boards, etc. it is still found that the students benefit from teacher-directed instruction and prompting in some cases (Coleman et al., 2015; Benitez et al., 2016).

n2y. One form of CAI is a program called n2y. n2y is effective symbol-supported tools and materials for students with special needs. n2y is cloud-based learning for special education which develops the special education curriculum, lesson plans, and materials so teachers can spend their time teaching rather than adapting curriculum written for regular education students. n2y is a program that is used in the Wentzville School District (WSD), albeit not as regular as it

needs to be by all essential skills classroom teachers. n2y was started by Jacquie Clark, a speech-language pathologist with over 30 years of experience (n2y, 2016).

n2y is CAI, which uses many forms of symbols in order to teach students with varying degrees of disabilities about the world around them and specifically how to read. Symbols are something that represents something else (Becker, 1994). Several examples of symbols would be figures, signs, images, letters, and numbers. For thousands of years, humans have used symbols to communicate with each other such as cave drawings or rock paintings (Becker, 1994). Guisepi (2006) reminds us that hieroglyphs were the ancient form of communication used in ancient Egypt, dating back 5,000 years, again indicating for thousands of years people have been communicating thoughts, experiences, and knowledge through the use of symbols.

With the addition of symbols to help in reading it has been found that there is a much greater chance that the students with ID are better able to learn to read functional sight words due to the heavy symbol-related information in n2y (n2y, 2016; Ryan, et al., 2011; Hudson, et al., 2013). Students that already have a good understanding of symbols may require responses that are printed words rather than the use of n2y or another symbol based program (Hudson, 2013; Ryan et al., 2011). As the WSD tries to implement the n2y program it has been said by many of the essential skills teachers that they wish they had more instruction on how to use the program. If more training on the program were

done in a whole group setting it would stand to reason that it would be standardly used across the district and therefore more advantageous to the students.

SnapWords. SnapWords is the concept of embedding a word with a visual rather than having a visual next to the word (Your Child Can, 2016). Sarah Major designed SnapWords after trying to teach a group of rather bright Kindergartners sight words. She found she was unsuccessful because the students were not able to remember the words she was teaching.

> One day after sounding out “help” multiple times, Sarah was sad to find that no one remembered ever seeing the word before. In desperation, she asked, “What does this word *look like* to you?” One little boy said, “It looks like someone raising his two arms and yelling “HELP!” And so SnapWords were born. Each word was designed with kid-feedback until the first 306 words were created and refined (How to Help, p., 2).

Pairing pictures with text may make the text more accessible for students with ID; however, that research has not been conducted to date (Erickson, et al., 2009). Pairing a picture by a word is much less effective than embedding a picture within the word. SnapWords can be learned as quickly as snapping a picture with a camera and most struggling readers need images to help them to learn to read. Most struggling readers are visual learners who think in pictures rather than symbols (How to Help, 2016). Since letters are symbols in the simplest

form, it stands to reason that pictures would likely be a quicker way for students with ID to learn to read (How to Help, 2016; Courtade, et al., 2013).

Summary

As the research stated, it is important that students with ID learn to read functional sight words so they can navigate through life and their surroundings without facing life-threatening situations and not knowing what to do (Goldstein, 2011; Hansen et al., 2014; McGrew et al., 2004; & Ruppar et al., 2014). WM and PS do appear to have an impact on the acquisition of functional sight words (Butnik, 2013; Alloway et al., 2011; Swanson et al., 2012; Alloway et. al., 2013). There is some disagreement as to whether trying to teach students with ID functional sight words using symbols or embedded pictures is the best way. There is CAI research to support that n2y is an effective way to help students with ID to learn functional sight words (n2y, 2016; Ryan et al., 2011; Hudson et al., 2013). On the other hand, there is also research to back up that embedded images found in SnapWords also helps students with ID to learn functional sight words (How to Help, 2016; Courtade et al., 2013; Whitney, 2013).

It is our hypothesis that WM and PS do play an important role in the acquisition of functional sight words. We also hypothesize that the embedded images in SnapWords will work better than the computer aided instruction in n2y in teaching students with ID to learn to read functional sight words.

How do working memory and processing speed index scores relate to functional sight word acquisition for students in essential skills classrooms? Which of the two programs that WSD currently has access to, is the better way to teach functional sight words?

Definitions

Intelligence Quotient (IQ) means how well a person can learn, understand, remember, and problem solve, compared with other people of the same age, in the same culture, and who have had the same opportunities (Cornoldi, et al., 2014; Holdnack, 2003).

Full-Scale IQ according to Wechsler provides subtest and composite scores that represent intellectual functioning in specific cognitive domains (e.g., verbal comprehension, working memory), as well as a composite score that represents general intellectual ability (History of Intelligence Testing, 2016).

Free Appropriate Public Education (FAPE) is a free appropriate public education that must be available to all children residing in the State between the ages of 3 and 21, inclusive, including children with disabilities who have been suspended or expelled from school, as provided for in Sec. 300.530(d) (Building the Legacy).

Education for All Handicapped Children Act (EHA) P.L. 94-142 the first piece of legislation mandating guaranteed a free appropriate public education to each child with a disability. This law had a dramatic, positive impact on millions of children with disabilities in every state and each local community across the country (Public Law 94-142).

Individuals with Disabilities Education Act is the reauthorization of EHA in 1990.

Intellectual disability formerly labeled “mental retardation,” is defined by the Individuals with Disabilities Education Act (IDEA) as “significantly subaverage general intellectual functioning, existing concurrently [at the same time] with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child’s educational performance.” There are two key components of this definition: a student’s IQ and his/her capability to function independently, usually referred to as adaptive behavior.

Functional literacy is defined as the ability to perform a multi-faceted set of tasks to meet a host of personal, social, and workplace needs (Collins et al., 2007).

Functional words are words that an individual needs to know in order to live in society, such as which door to go in and out of, which bathroom to use in public. Basically, words needed to survive at the lowest level of functioning (Mechling et al., 2007).

Connected Text is a minimum of two words that present a coherent message such as, green cup, fire escape, etc. (Alberto et al., 2010; Burns, 2007; Coleman et al., 2015).

Working Memory refers to the capacity to store and manipulate information in mind for brief periods of time (Alloway 2010, p., 448).

Processing Speed involves one or more of the following functions: the amount of time it takes to perceive information, process information and/or formulate or enact a response. (Braaten, 2014, p., 1)

Chapter Three: Methodology

For many years, in the school systems across the nation, literacy has been an important component in teaching all students including students with an Intellectual Disability (ID). More accurately, there was nothing unique or more specified by the Wentzville School District (WSD) to teach students with ID to read. The special education teachers have to use leveled book sets from the library or phonics books that they found on their own to teach their students to read. The teachers in the essential skills classrooms were expected to use the resources available for regular education students and modify those materials for the students with ID. The books provided for the regular education students were not meeting the needs of the students in the essential skills classroom. Special education teachers modified these books on their own time and used their own resources to meet their student's literacy needs.

Beginning in the 2014-2015 school year, the WSD purchased a subscription to the n2y program for all teachers that taught in the essential skills classrooms. This is a computer-based program with all of the core subjects differentiated on three different levels based on the students' complex needs. All of the essential skills teachers were instructed by the process coordinator to use this program to the fullest extent. Professional staff development has not yet been offered, therefore; the n2y program is not being used to the full potential by all essential skills teachers. There were webinars that could be watched on how to use the program. However, they are quite lengthy and have to be done on the

teacher's own time. The teachers that took the initiative and spent time learning and using the program feel there is merit to using the program and that at the present time it is being underutilized by the professionals that teach in the essential skills programs within the district.

SnapWords is another program that was purchased and is currently being used by two classrooms at Heritage Primary (HP) elementary school. The remaining nine elementary schools within the district do not have access to the program at the present time. There are three essential skills classrooms in the HP building, and only two of the three use the program. The program was purchased in the 2014 – 2015 school year and the special education budget paid for the program. The two teachers that used SnapWords in their classrooms learned the program on their own as training was not available at the time.

The ability for students with ID to learn functional words is more important in today's society than ever before. These students no longer end up being placed in institutations. They now live and work in all areas of society. Without the ability to read functional sight words students with ID are not be able to live up to their full potential and it would be impossible for them to get around their city or even neighborhood on their own. With researchers' findings that students/adults with ID can learn to read, it is our obligation to find the most effective instructional method to teach them. In doing so, they will become more productive and learn to live up to their potential in group homes or on their own.

Working Memory (WM) plays an important role in a student's ability to hold information in their short term memory until it can be shifted into their long-term memory, therefore, being able to generalize information that has been learned. Processing Speed (PS) also plays an important role in learning information, quickly taking in information, processing it and then producing a response to what is being asked. It was not known if WM and PS played a role in learning and generalizing functional sight words by the n2y or SnapWords programs. This was one area of our research that we were searching for an answer.

To that effect, how does WM and PS index scores relate to functional sight word acquisition for students in essential skills classrooms? Which of the two programs that WSD currently has access to, is the best way to teach functional sight words?

Research Sample

The research was focused entirely on the students in one essential skills classroom at HP. When we began our research we thought each of the students would have an IQ of 70 or below as measured by the Wechsler series of IQ tests. All of the students had previously met the state criteria of ID with the exception of one, and she met the eligibility of Young Child with a Developmental Delay with a Full-Scale IQ in the ID range. The students ranged from six through ten years of age and were in kindergarten through fifth grade.

Research Design

Before research began, the action research was introduced to the parents and consent forms signed, if the parents agreed, to identify participating members in the research. The research began in September 2016 and concluded in April 2017.

The research was conducted through a mixed-method approach which began with the administration of either the WISC-V (ages 6.0 through 16.11) or WPPSI-IV (ages 2.6 through 7.7) (depending on the age of the child at the time of testing). The WM and PS subtests were given to get updated information in both areas. The four subtests that measured WM and PS were administered by Faith Gardner, trained psychological examiner, who was working in conjunction with Carolyn Samuelson, essential skills teacher, conducting the research. One of the students had a WISC-V given by a psychologist due to his neurofibromatosis 1 (NF1). The four subtests administered to each student on the WPPSI-IV or the WISC-V took approximately ten minutes. It took a bit longer with some of the students, due to the examiner having to establish rapport in order to get best results from each student. Several of the students went with Gardner to be tested and she had to bring them back to class because they did not cooperate with the examiner due to them not knowing her well enough. Gardner took more time in the classroom with several students who did not want to participate in testing. After several months of Gardner going into Samuelson's classroom the students became more familiar with Gardner and she was able to

administer the subtests needed to determine WM and PS on each of the students participating in the study.

Samuelson established a baseline with each of the students on the words in the n2y and SnapWords program for the month of September. With the exception of one student, Samuelson had previously established rapport as she had these students in her classroom in previous school years. The students that were in the research study did not have to establish rapport, therefore, the researchers determined that Samuelson was the better choice to get the baseline from each student. Each student took approximately 30 minutes for Samuelson to take the baseline data.

Data Collection Procedures and Instruments

The focus of our research was to determine how WM and PS related to the acquisition of functional sight words. We were also focused on the two reading programs that WSD used in the essential skills classrooms at HP, and which program produced more growth in learning the functional sight words for students with ID.

The WM and PS subtests are divided by two subtests in each area. On the WPPSI-IV the Zoo Locations (Figure 3.1) and Picture Memory (Figure 3.2) were the subtests given to establish the WM Index score. With Zoo Locations, the child viewed an animal card (or cards) that had been placed on a zoo location map for a brief period of time. The examiner then picked up the card(s) and

asked the student to place the animals back on the zoo location map where they lived. On the Picture Memory subtest, the child was shown a “stimulus” picture of one of the items that would appear on the next page i.e., a star. Then the page in the test booklet was turned and the child was shown the star mixed in with an array of other items. They are asked to look at the “stimulus” picture for a short period of time, remember it and then point to the item they just saw. This subtest got harder by having more “stimulus” pictures and/or more pictures within the array of answer choices.

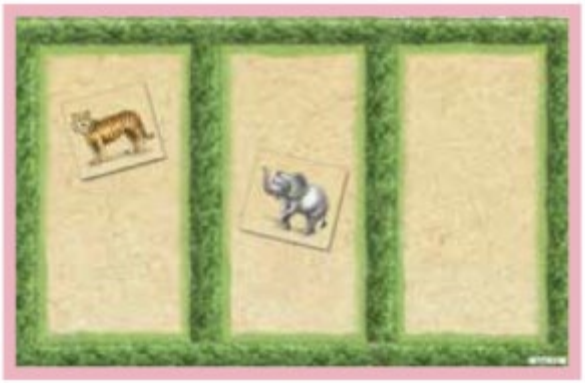

Figure 3.1 Zoo Locations subtest on the WPPSI-IV.

Figure 3.2 Picture Memory subtest on the WPPSI-IV.

The PS Index scores were calculated on the Bug Search (Figure 3.3), and Cancellation (Figure 3.4) subtests. The Bug Search subtest was essentially a "matching" activity done within a specific time limit. The child saw the bug in the far left box and had to "stamp" the matching bug in that line with his/her ink dauber. In the Cancellation subtest, children were shown a series of related objects. They were then shown an organized (i.e. in rows) and later, an unorganized (i.e. "random") page filled with items of child-friendly pictures such as clothing, toys, animals, cars, etc. The child used the ink dauber and stamped each item of the particular category that was called for in the assessment that he saw within a specified time.

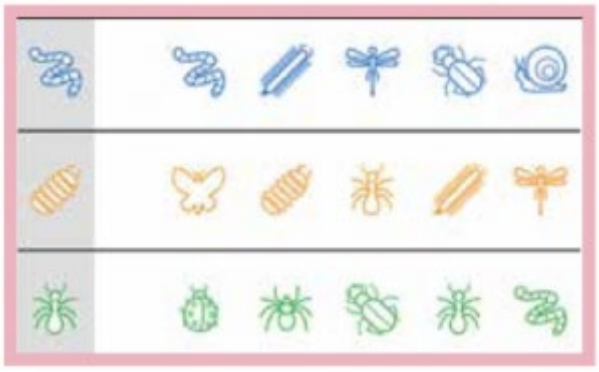

Figure 3.3 Bug Search subtest on the WPPSI-IV.

Figure 3.4 Cancellation subtest on the WPPSI-IV.

On the WISC-V WM and PS Index scores were measured with two subtests in each index area as well. They were, however, different than the ones that were presented in the WPPSI-IV. The two subtests in the WM Index were Digit Span and Picture Span. The Digit Span had three different ways that the numbers must be presented. The first thing the examiner said were numbers beginning with two digits, progressing up to eight digits, and the child had to repeat the numbers back in the exact order the examiner said them. The next section, the examiner said the numbers and the child had to say them in the reverse order that the examiner said them, ex. examiner says 7 – 9 and the child would have to say 9 – 7 to receive credit. Again this section became increasingly difficult as it went up to eight numbers as well. The final section of the Digit Span subtest was when the examiner said the numbers the child had to say them back in numerical order beginning with the lowest number. These numbers could not be repeated in any of the three sections, so if the child failed to listen, they woud generally get the answer incorrect. The second subtest for the WM Index was

the Picture Span subtest. The child was shown a picture mixed into an array of other items. She was asked to look at the “stimulus” picture for a short period of time, remember it and then point to the item she had just seen. This subtest got harder by having more “stimulus” pictures and/or more pictures within the array of answer choices. Pictures children have seen earlier in the test may also be repeated, so the child had to remember if this was something they had previously seen or something she saw earlier on a different question. This subtest was just a bit different than in the WPPSI-IV, as the child had to point to the pictures in the order in which they saw them on the stimulus page.

The PS Index score was calculated using the Coding and Symbol Search subtests. The Coding subtest (Figure 3.5) is timed, and the child must copy the marks inside of the shapes into the shapes below that are empty. This subtest had an allotted time limit that the examiner then had to stop the child where they were on the page. On the Symbol Search subtest, the student saw one or two symbols (depending on their age) on the left side of the page and had to mark the symbol that matched or the word NO if there was not one that was the exact same as the one(s) that were off to the left. The Symbol Search subtest was timed as well.

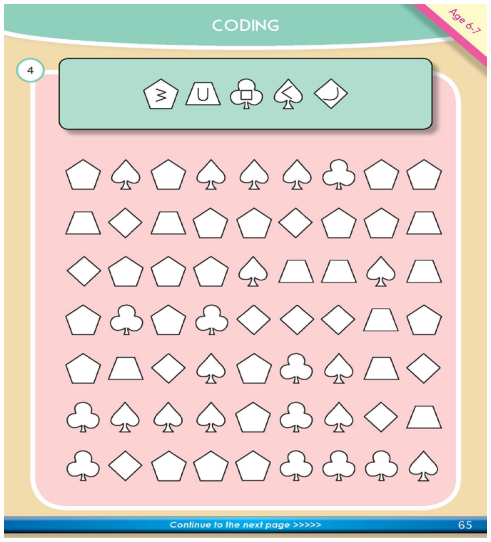

Figure 3.5 Coding subtest on the WISC-V for the younger children.

A pre-assessment was given to each of the students to determine how many functional sight words they knew from each of the programs, n2y, and SnapWords. The students were not prompted in any way while the pre-assessment was given. Per standard course of action for the group, all students were given the pre-assessment. The data points in each program were taken once a week in the morning for continuity in data.

The n2y baseline was administered on the computer at the beginning of the school year in August of 2016. The n2y program only presents 12 functional sight words per month. The words were taught in varying modalities to each student every day of the school week. Data points were taken each week with the post-assessment test given on the computer at the end of the month to determine what percentage of words they acquired within the month. n2y only presents 12 words per month. Therefore, this was all that could be presented

within this program. n2y is a theme based program and the functional words presented were used for all core subject areas. The words were presented in color (Figure 3.6), related to the text within the program and had a computerized voice to speak the word while the student repeated the word and then said them with the computer as they learned the words.

Figure 3.6 Example of how n2y words are presented to students.

Data was also collected on the SnapWords program in the same way as n2y. A baseline was established with 20 unknown words for each child in the study. Data points were taken once per week after the words were taught each day. At the end of the month, there was a post-assessment and a new set of 20 words was provided for the following month.

SnapWords were presented in color, a picture of the word, an action that went with the picture as well as the teacher using the word in a scripted sentence that made the abstract word more meaningful for the student (Figure 3.7).

Figure 3.7 The front of the SnapWords card

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As the student became more proficient reading the word on the front of the card, they began to generalize the word using the back of the card, which was presented as just the word on the card. Our study did not measure whether or not the student generalized the word as we only researched the acquisition of the word itself.

After consent for the students to participate in the study was signed by the parent, the parents were given assurance that all data was coded for confidentiality using a cipher known only to the researchers denoting participants in our transcripts.

Data Analysis

Data points were entered into an Excel spreadsheet for analysis and charting. Results from the study was analyzed and put into graphs denoting the

acquisition of the functional sight words for each student in the study. The WM and PS were also configured into the charts indicating how these scores may or may not have helped or hindered in the acquisition of the words.

Ethical Considerations

The risks to students were minimal as they were all taught the same way as any other year, and data points were taken as in any other special education classroom. As Samuelson was the student's teacher, she had to assure the parents that the students' involvement was strictly voluntary and should they have opted out of the study it would not harm their child's instruction. They still received the same instruction as in years past. The students grades would not be affected by their choice to participate or not.

We safeguarded the student's data and confidentiality in this study. We reported the data using cipher without identifying information so that the privacy of the students was protected at all times. The data sheets were kept under lock and key, and Samuelson and Gardner were the only two with the key to that cabinet.

The parents of each student were contacted at "Meet the Teacher" night to explain the research that was going take place with their child, and informed consent was provided explaining the study and how the information was going to be used. The parents had the option to sign the consent at the time of the meet the teacher night, or they were also given the option to take it home and send it

back to Samuelson. The parents were informed that the data may be presented within the district at administrative meetings, curriculum and instruction meetings, and/or school board work sessions.

Trustworthiness/Reliability/Validity

There was a variety of data collection methods used. Standardized tests (WISC-V/WPPSI-IV) measuring the WM and PS, and collection of data on pre-assessment and post-assessment of varying functional sight words used in the study, as well as data points, collected each week during the study. By collecting data from these sources, we were able to triangulate the findings, therefore, increasing the validity and reliability of the study.

Limitations of the Study

It was difficult to generalize this study as there was such a limited number of students that participated in the study. Data was collected over a short period of time and occurred in one classroom in the entire district. The mood, behavior, and health of the child at the time the data was collected were areas of limitation as well. Lastly, the varying scores in the WM and PS would be difficult to replicate. A longitudinal study would need to be conducted in order to indicate definitively which program (n2y/SnapWords) is the best method of teaching students with ID functional sight words.

Summary

It is becoming more apparent that students with ID need to learn to read like all other students in the education system. There is limited research as to the best way to teach these students. Therefore, our research determined if n2y or SnapWords was the best instructional strategy to teach reading. It was our hope that whichever way was found to be most productive in teaching students with ID to read, the WSD will adopt that method(s). In our research, we found that WM and PS do not play a significant role into the acquisition of functional sight words.

Chapter Four: Results

With the goal of determining if computer assisted instruction (CAI) or teacher directed instruction (TDI) works better to teach students with an Intellectual Disability (ID) to read and to determine if Working Memory (WM) and or Processing Speed (PS) play a significant role in the students learning the sight words, our study began in September of 2016 and ended in April of 2017. The data that is presented seeks to answer the following questions: how do working memory and processing speed index scores relate to functional sight word acquisition for students in essential skills classrooms? Which of the two programs that WSD currently has access to, is the better way to teach functional sight words?

Description of the Participants

Participating students were specific to researcher Samuelson's essential skills classroom. There was one student in kindergarten, one in first grade, one in second grade, one in third grade, two in fourth grade and one in fifth grade. The participants included five boys and one girl. To protect the identity of the student participants, we used pseudonyms to record data throughout our research. Although the WM scores ranged from 45-70 and the PS ranged from 45-56 the data found shows that the WM or PS did not play a significant role in the acquisition of functional sight words.

Data Exhibiting the Number of Words Used in the Research

While we know that teaching students with ID to read functional sight words is essential to the independence they will have once they are out of school, Figure 4.1 contains information showing the number of words used during the eight months of research as well as how many words each participant learned using SW and n2y.

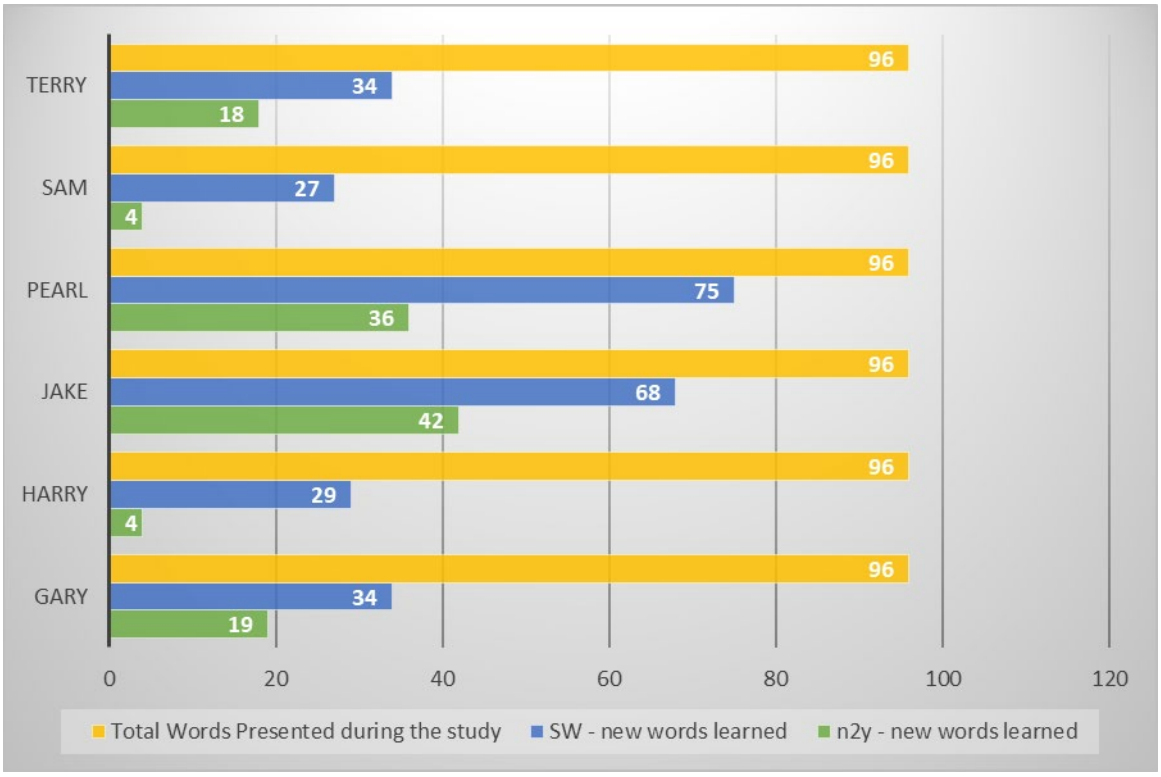

Fig. 4.1 Ninety-six words were presented in each program denoted by the yellow line. The number of new words learned by each participant is shown on the blue and green lines.

Quantitative Data Showing the Growth of Each Student Using n2y and SW

Researchers Gardner and Samuelson took baseline data at the beginning of each month to determine how many of the twelve words presented from SnapWords (SW) and n2y that each participant knew. The words were presented each school day during the month. Data was collected once every week school was in session and then a post-assessment was given at the end of the month to determine the growth made using SW and n2y. The following figures show the percentage of growth made by each of the students in the study (Fig. 4.2 - 4.7).

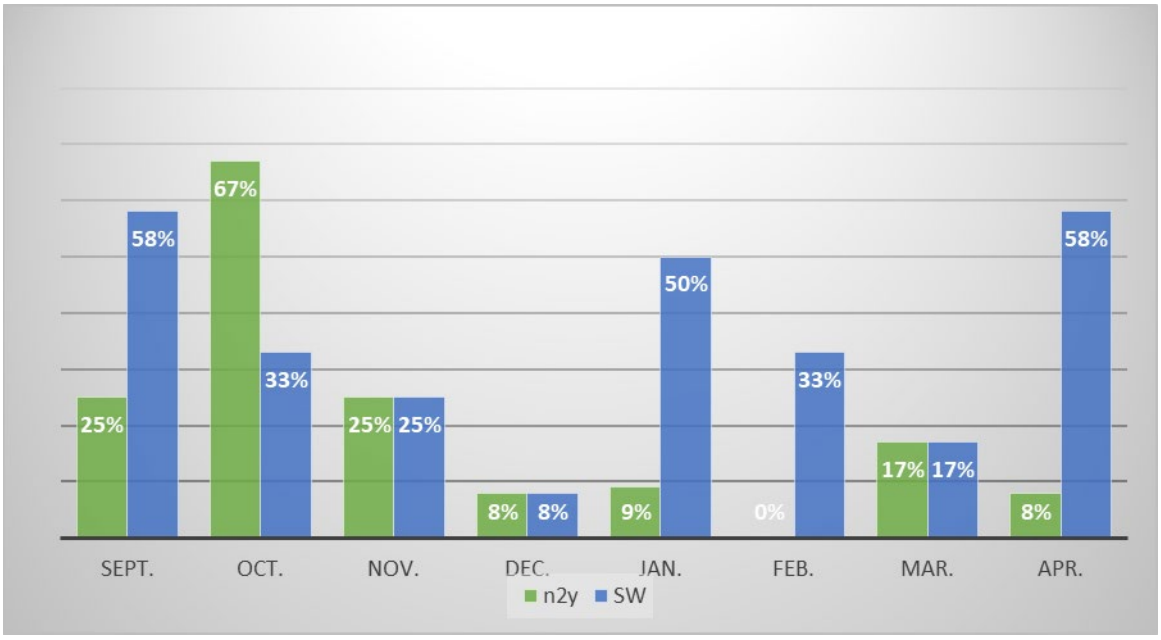

Fig. 4.2 Gary's average growth per month using n2y and SW to teach functional sight words

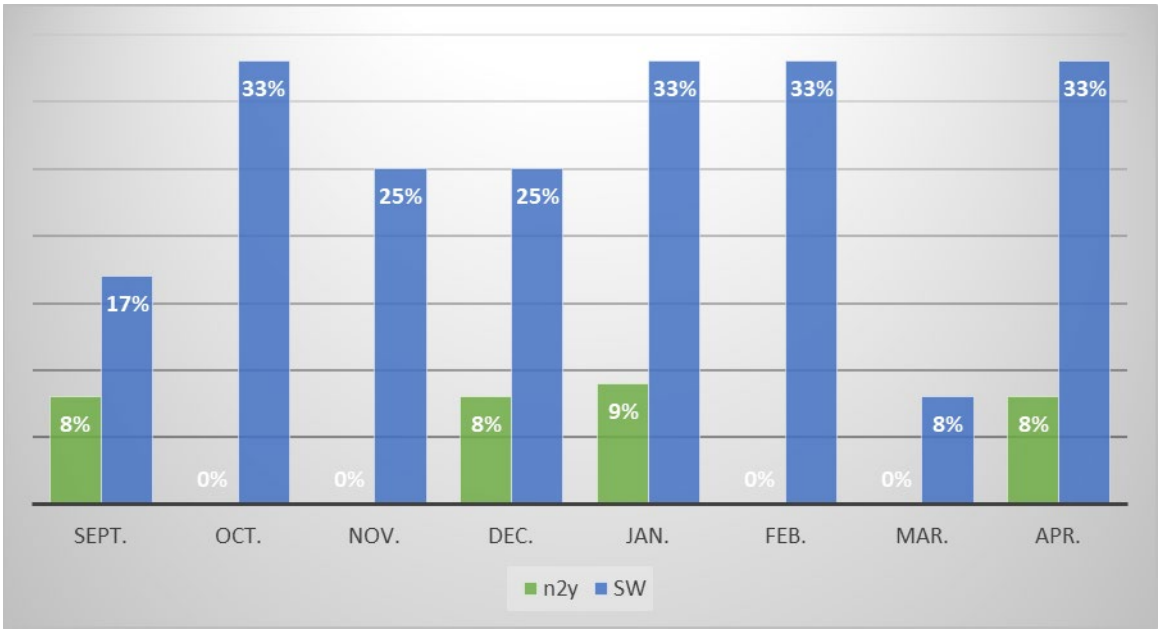

Fig. 4.3 Harry's average growth per month using n2y and SW to teach functional sight words

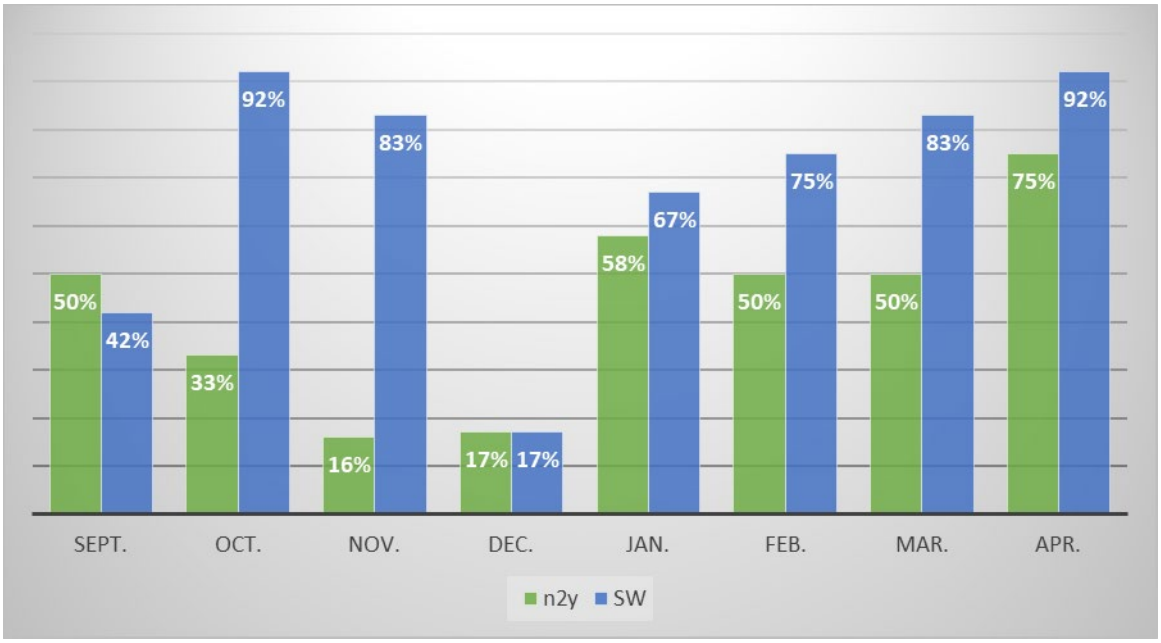

Fig. 4.4 Jake's average growth per month using n2y and SW to teach functional sight words

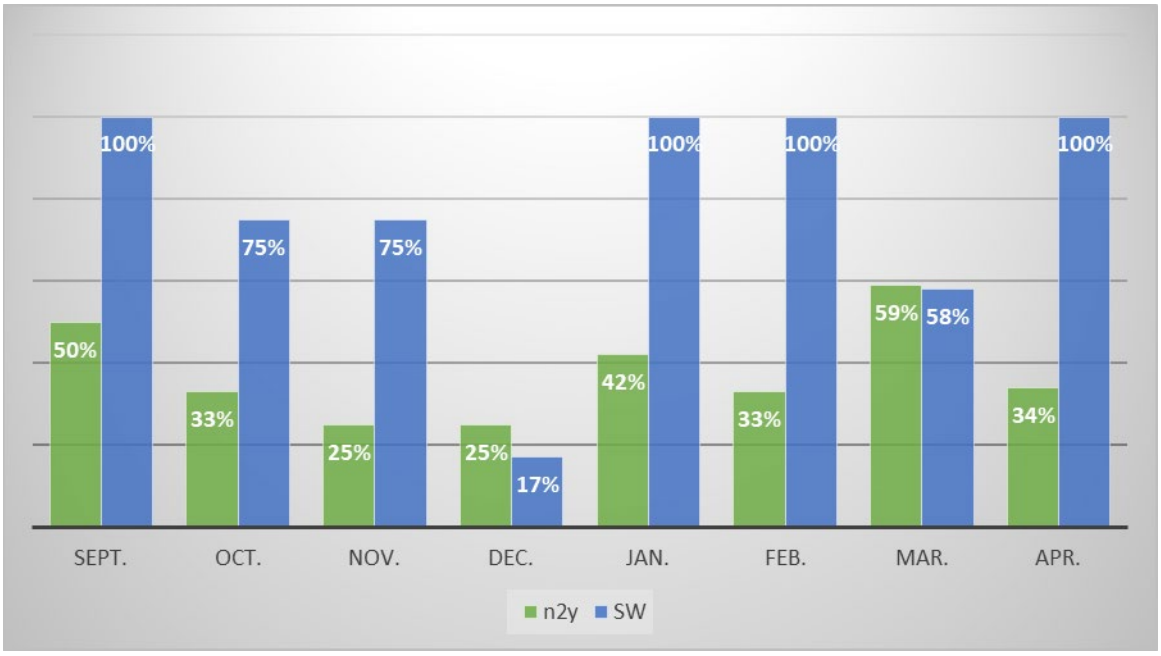

Fig 4.5 Pearl's average growth per month using n2y and SW to teach functional sight words

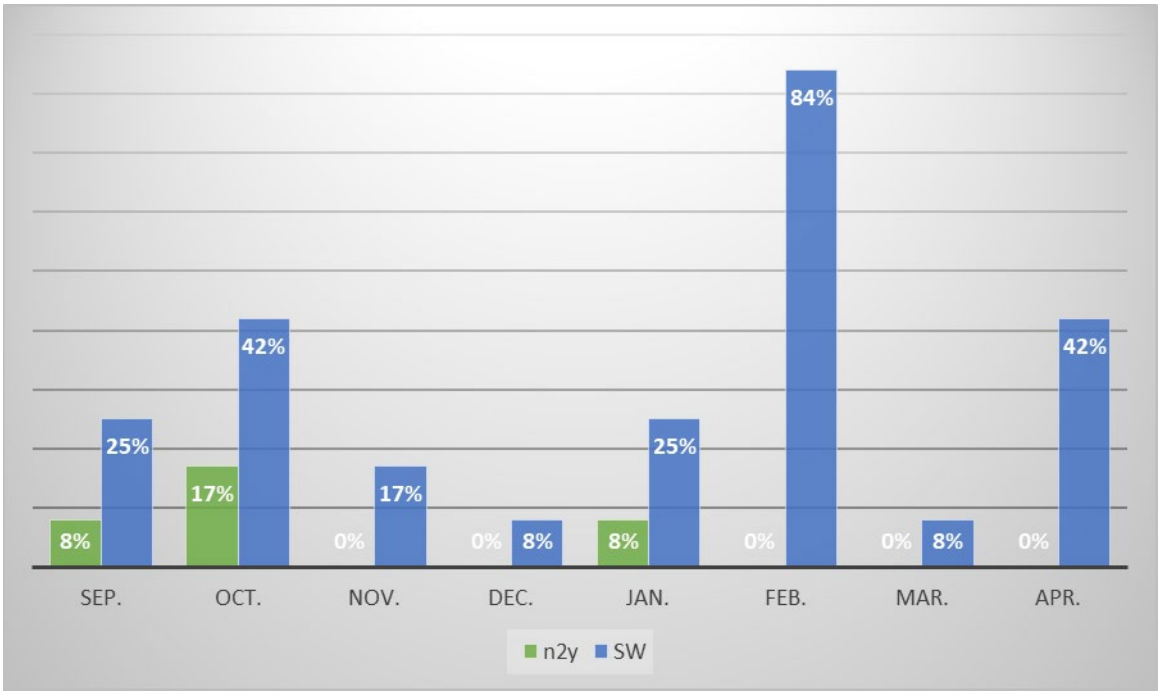

Fig. 4.6 Sam's average growth per month using n2y and SW to teach functional sight words

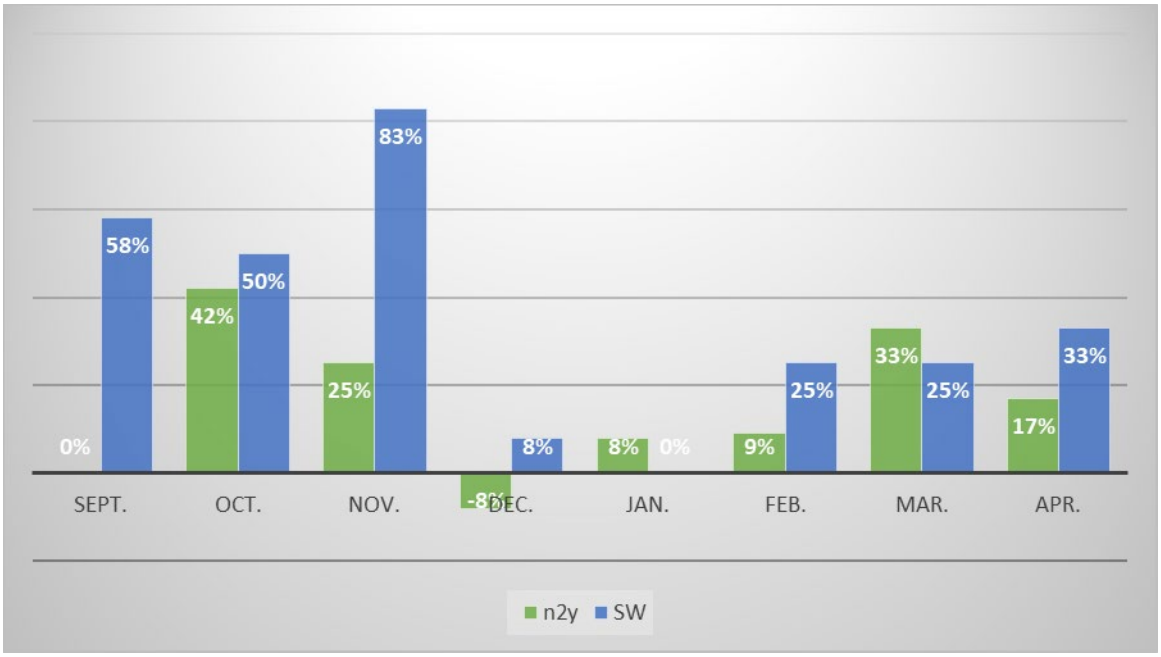

Fig. 4.7 Terry's average growth per month using n2y and SW to teach functional sight words

As the figures show each of the participants made much more progress with the use of SW (TDI) than n2y (CAI) with a few exceptions.

Quantative Data Depicting WM and PS Results

The WM score for each student was assessed using the two subtests from the Weschler series IQ test to determine the WM Index Score. Figure 4.8 shows the participants' names with their WM Index score next to it. The participants are ordered in the visual by WM score. The blue bar represents the progress made using SW while the green bar represents the progress made with n2y. The scores through the eight months of the study were averaged and the following figure shows the progress made with each program. All of the participants made

significantly more progress using the SW program regardless of the students WM Index score.

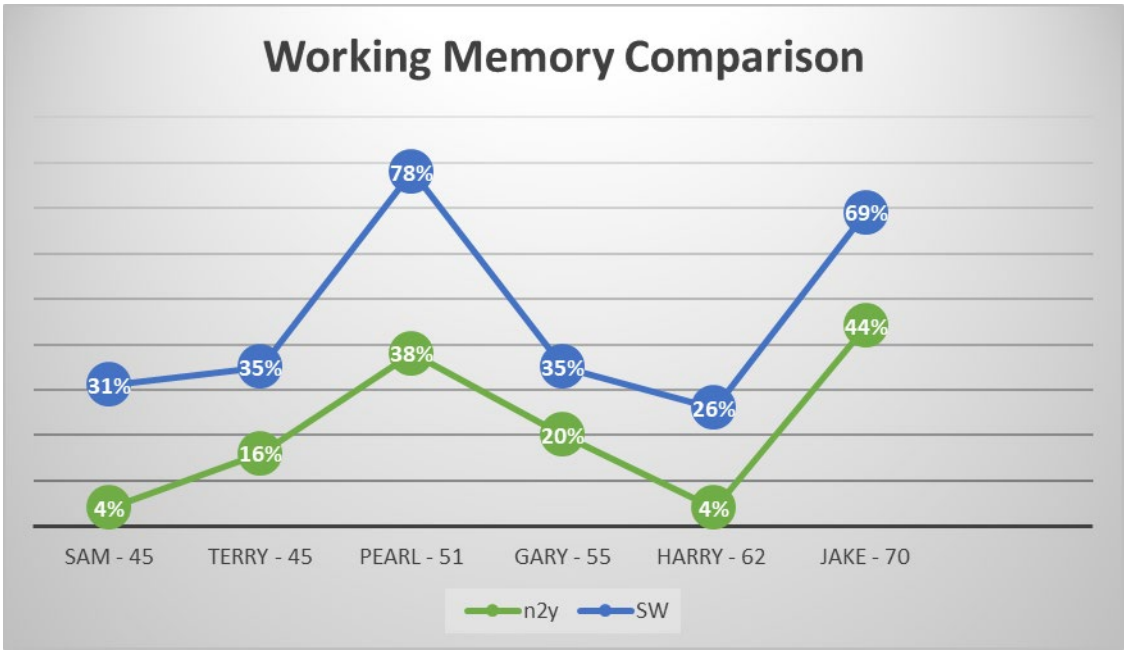

Fig. 4.8 Percentage of progress on sight word acquisition comparing WM and averaged throughout eight months per participant.

Figure 4.9 shows the average of each student's growth in acquiring sight words demonstrating that the SW program is a much better program than n2y to teach functional sight words to students with ID. The following figure depicts the relationship between PS Index score and the acquisition of functional sight words. The SW program was again a more successful program than n2y.

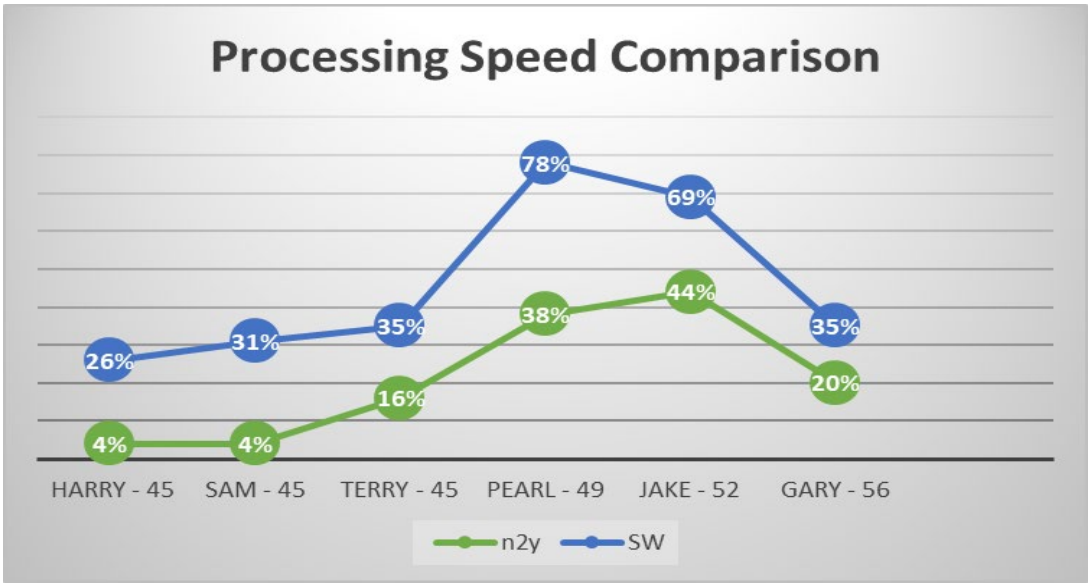

Fig. 4.9 Percentage of progress on sight word acquisition comparing PS and averaged throughout eight months per participant. The participants names were listed from the lowest to highest PS Index score.

While the figures above show that the SW program far exceeds the n2y program to teach students with ID, Figure 4.10 represents the difference of each participants gain in SW compared to n2y.

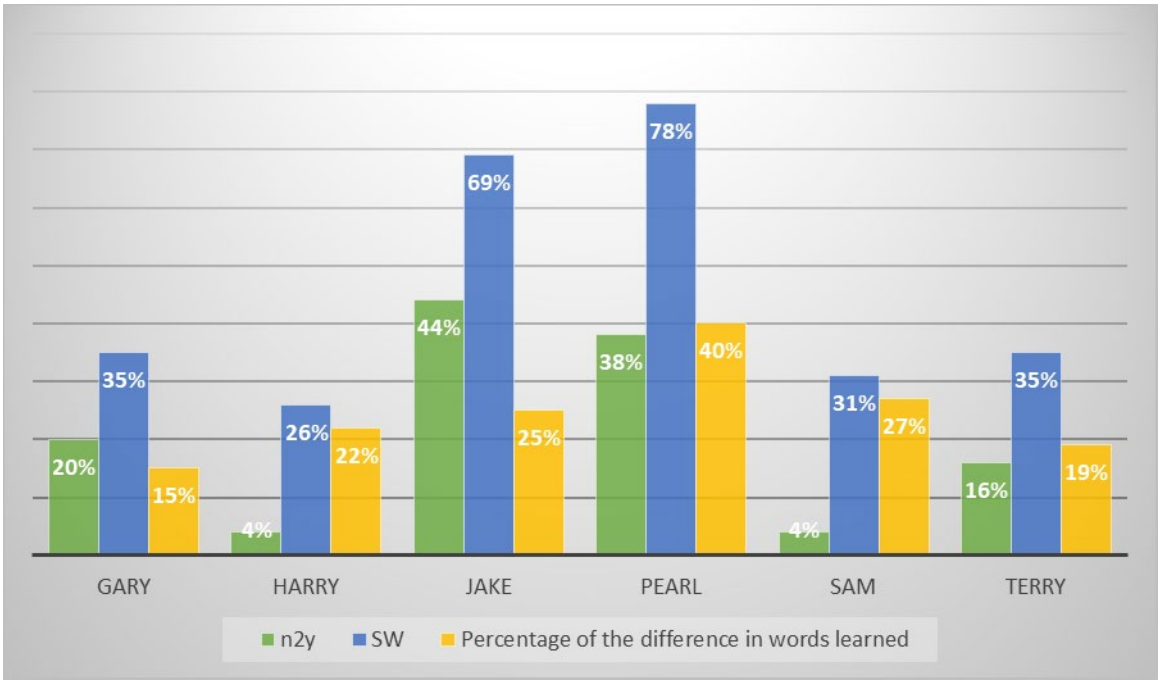

Fig. 4.10 Shows the participants names on the x axis with the percentage of words learned through the eight months of research as well as the difference in percentage between the SW and n2y programs as noted by the yellow bar.

Lastly, Figure 4.11 compares the growth made with each program by month averaging all participants in the study. It is clear to see that all eight months the participants averaged higher on the SW than n2y or equal progress on each program. All months with the exception of December and March there was 66 percent up to 100 percent more progress being made with SW. While December and March did show that SW was a higher percentage than n2y or equal progress, it was only 17% higher.

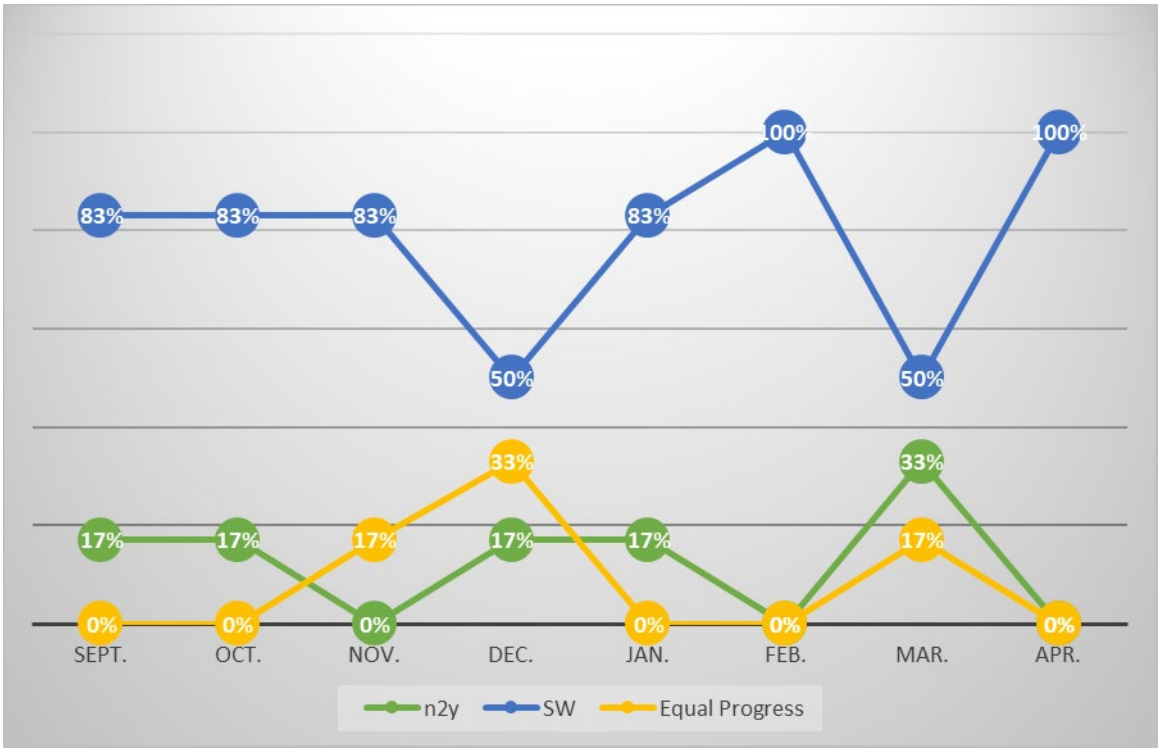

Fig. 4.11 Average progress made by all participants during each month of the study.

Summary

Through our research we found that SW program worked better to teach functional sight words to students with ID than n2y. Interestingly, we found in our study, that the WM and PS Index scores did not appear to help nor hinder the participant's acquisition of the functional sight words. With WM Index scores ranging from 45 through 70 (25 point difference), which is significant in itself, the participants of all abilities learned SW much quicker and retained the words better than with n2y. The same is true for the PS Index scores, although the range of 45 through 56 is only an 11 point difference, the participants continued to make progress commensurate with each other.

Chapter Five: Conclusions

We know how important it is to learn how to read regardless of your IQ. Since the implementation of FAPE with PL 94-142 in 1975, there have been many studies on the best way to teach students with an intellectual disability (ID) (Browder et al., 2014). Literacy is essential for students' education, however, when teaching students with ID to read they are often faced with disadvantages in regards to acquiring their literacy skills. Students that are ID face many challenges in life, which prevents them from performing simple daily tasks that require reading (National Center for Education Statistics, 2013; Coleman, et al., 2012).

How do working memory and processing speed index scores relate to functional sight word acquisition for students in essential skills classrooms? Which of the two programs that WSD currently has access to, is the better way to teach functional sight words? These research questions seek to answer if the acquisition of functional sight words is affected by Working Memory (WM), Processing Speed (PS), n2y or SnapWords (SW). This group of students was just a small sampling of the population of Wentzville School Districts actual number of essential skills classrooms/students. The students in the study have were in Samuelson's essential skills classroom since they have been in the Wentzville School District ranging from one to five years. They have all received the same consistent instruction with regards to reading with the n2y and SW programs throughout the study.

There were important findings in Gardner and Samuelson's study, however, it cannot be generalized because of the small sample size as well as the short time period of the study. The results of the study were encouraging to us as to the most effective way to teach students with ID to read.

Analysis of Results

Evaluating the information gained through the study did show some significant findings in teaching functional sight words to students with ID. Teaching students to read can be trying to say the least, but teaching students that are ID makes the challenge much more difficult than with the average learner. Today more than ever, school districts are relying on research based instructional strategies to teach students in every subject area from Kindergarten through 12th grade.

Gardner and Samuelson were sure that the participants in the essential skills classroom would learn significantly more functional sight words with the SW program than with the n2y, and we were not surprised by the results. With the n2y program being a researched based Computer Aided Instruction (CAI) instrument it would stand to reason that it would be the more effective program in teaching sight words especially given that SW has no research to back the claims it makes stating that students with varying degrees of ability can and do learn sight words. All of the participants in our study acquired more functional sight words with the SW program in each of the eight months of the study. We

were surprised that the n2y program did not produce better results since it is a researched based program that claims to help students with ID learn to read sight words in text.

Gardner and Samuelson have discussed that WM and PS do play a significant role in the acquisition of sight words with students in general and specifically the ones that are ID. We were surprised that regardless of the WM and PS Index scores there was no correlation as to which of the participants acquired more functional sight words.

Working Memory Index scores ranged from 45 through 70. Pearl's WM Index score was 51 while Harry's was 62 and Pearl learned 52% more functional sight words using the SW program than Harry and 34% more using the n2y program. Overall, however, Pearl learned 40% more words with SW and n2y and Harry only learned 22% more words using SW than using n2y.

The PS Index scores ranged from 45 through 56. Pearl's PS Index score was 49 while Gary's was 56 and again Pearl learned 43% more functional sight words with SW and 18% more n2y. In the end, Pearl learned 40% more words using SW than n2y and Gary acquired only 15% more using SW than n2y.

It would behoove districts around the world to do more research on programs that already exist to teach students to read especially given the information that we found with one program being researched based (n2y) and one with no research to back their claim (SW). With literacy playing such an important role in helping people become a more productive member of society

(National Center for Education Statistics, 2013) it is imperative to study and research more options in teaching reading to all students, but specifically to students with ID.

All of the participants in our study made significantly more growth using SW than they did with the n2y program. Although it is clear that students were able to learn more new words with the SW program than n2y, when the participants were asked which program they liked better the decision was split with three liking the SW and the other three liking the n2y program more.

Discussion of how the study compared to the literature

This action research studied how WM and PS played into the acquisition of new sight words as well as which program was better: the n2y or SW. The literature on the acquisition of sight words for people with ID is limited at best. The referenced sources and their work cited in this study range from 2004 to 2016.

Research on how to teach students with intellectual disabilities has "rapidly evolved in the past 40 years" (Browder et al., 2014), there were no studies that could be found as to what type of program works best to teach them functional sight words. Gardner and Samuelson know that literacy is a very important part of education as well as enabling students to live productively in our society (Coleman, et al., 2012) and the inability to read presents with a major

disadvantage in finding vocational work or other opportunities after graduation from high school (Alnahdi, 2015; Collins et al., 2007; Ruppar et al., 2015).

The question of how to best teach students with ID to read is in its infancy as far as what method/program results in greater acquisition of the sight words. For our study we compared the two programs Wentzville School District has available at the present time. One program is n2y, CAI and the other is SW, visuals with pictures embedded in the word. It was our hypothesis that the SW would work better to help the students be able to learn the sight words. Most struggling readers see the words as symbols, rather than learning to decode them (How to Help, 2016; Courtade et al., 2013). Students with ID by their very nature are struggling readers due to their low cognitive ability. Pairing pictures with text may make the text more accessible for students with ID; however, that research has not been conducted to date (Erickson et al., 2009).

While data based research could not be found on how WM and PS play into the acquisition of functional sight words, Alloway, 2010 said scores on WM tasks can and do at times predict reading achievement in students with ID, which was our hypothesis when we began our study. What we found was that no discernable difference was found in the acquisition of functional sight words. Jacobson (2012) and Braaten (2014), state that PS deficits can and do affect reading even if the students know how to recognize and decode words. Gardner and Samuelson found, that among the students in their study that are ID, the PS Index score did not affect the process of learning new words.

Limitations of the Study

The opportunity to engage in our action research in one essential skills classroom was beneficial in proving or disproving our hypothesis but it also presented particular limitations. The participant size of our research was quite small in nature and much more research is needed to determine if what we found is comparable to what others may find with the same kind of study. It would be difficult if not impossible to replicate the study as there are varying degrees of medical issues with some of the students in the study as well as replicating the WM and PS Index scores.

Recommendations Based on the Conclusions and Limitations

For further research and studies within our district as well as nationwide, we believe it would be beneficial for the researcher(s) not be a classroom teacher of the students studied. Although we engaged in and did our research with fidelity, the fact that Samuelson was the teacher of the students, potentially could have played a role in deciding if the student(s) read the word in the correct amount of time as stated by the study.

Although our study did not ask the question of retention of the functional sight words, it would be interesting to determine if the acquisition of the words equaled the retention of the words. Research with older students and perhaps

adults with ID would become significant to determine if the programs worked as well as they did with the younger students.

A longitudinal study would need to be conducted in order to indicate definitively which program (n2y/SnapWords) is the best method of teaching students with ID functional sight words.

Upon completion of our study the Wentzville School District decided there was enough evidence to say that n2y is not the only option to teach students with ID to read. Our district purchased the SW program for all of the elementary essential skills teachers beginning in the 2017-2018 school year. It is our hope that they will continue to ascertain if the cards would work as well for middle and high school essential skills classrooms, Title 1 classrooms, RTI reading groups as well as allowing all kindergarten teachers access to SW to help their students that are struggling.

Summary

Finding that WM and PS play an insignificant role in students with ID acquiring functional sight words, it is suggested that teachers take on the responsibility to do some research of their own on programs that aren't necessarily based on research, but, may indeed help students become more literate.

Researched based instruction is important in teaching students a variety of skills. When schools only rely on this type of instruction they may be missing

out on some very effective programs and strategies that just have not had the research to back their claims to date. Finding SW to be a better program than n2y in teaching students with ID to read functional sight words is one example of a program that many schools would likely find useful for their students. However, if they only rely on researched based programs, many districts across the nation will never know how effective the SW program can be in teaching students to read.

References

Alberto, P., Waugh, R., & Fredrick, L. (2010). Teaching the reading of connected text through sight-word instruction to students with moderate intellectual disabilities. *Research in Developmental Disabilities,* 31, 1467-1474. doi.org/10.1016/j.ridd.2010.06.011

Alberto, P., Waugh, R., Fredrick, L., & Davis, D. (2013). Sight word literacy: A functional-based approach for identification and comprehension of individual words and connected text. *Education and Training in Autism and Developmental Disabilities,* 48(3), 332-350.

Allor J., Champlin, T., Gifford, D., & Mathes, P. (2010). Methods for increasing the intensity of reading instruction for students with intellectual disabilities. *Education and Training in Autism and Developmental Disabilities,* 45(4), 500-511.

Alloway, T. P., (2010). Working memory and executive function profiles of individuals with borderline intellectual functioning. *Journal of Intellectual Disability Research,* 54(5), 448-456.

Alloway, T. P., Bibile, V., & Lau, G. (2013). Computerized working memory training: can it lead to gains in cognitive skills in students? *Computer Human Behavior,* 29, 632-638.

Alloway, T. P., & Passolunghi, M. (2011). The relationship between working memory, IQ, and mathematical skills in children. *Learning Individual Differences,* 21, 133-137.

Alnahdi, G. H. (2015). Teaching reading for students with intellectual disabilities: a systematic review. *International Education Studies,* 8(9), 79-87. doi.org/10.5539/ies.v8n9p79.

Becker, U. (1994). *The continuum encyclopedia of symbols*. New York: Continuum Publishing Company.

Benitez, P., & Domeniconi, C. (2016). Use of a computerized reading and writing teaching program for families of students with intellectual disabilities. *Psychological Record,* 66, 127-138. doi.10.1007/s40732-015-0158-8.

Braaten, E. (2014). Processing Speed Introduction: What it is and what to do. *The Clay Center for Young Healthy Minds.* Retrieved from

http://mghclaycenter.org/parenting-concerns/grade-school/intro-processing-speed/.

Browder, D. M., Wood, L., Thompson, J., & Ribuffo, C. (2014). Evidence-Based practices for students with severe disabilities. *Ceedar Document No. IC-3,* 1-86.

Building the Legacy: IDEA 2014, U.S. Department of Education. Retrieved from http://idea.ed.gov/.

Burns, M. K. (2007). Comparison of Opportunities to Respond Within a Drill Model When Rehearsing Sight Words with a Child with Mental Retardation. *School Psychology Quarterly,* 22*(2),* 250-263*.* doi.10.1037/1045-3830.22.2.250.

Butnik, S. M., (2013). Understanding, Diagnosing, and Coping with Slow Processing Speed. *Twice-Exceptional Newsletter*.

Coleman, M., Cherry, R., Moore, T., Park, Y. & Cihak, D. (2015). Teaching sight words to elementary students with intellectual disability and autism: a comparison of teacher-directed versus computer-assisted simultaneous prompting. *Intellectual and Developmental Disabilities,* 53, 196-210. doi.org/10.1352/1934-9556-53.3.196.

Coleman, M. B., Hurley, K. J., & Cihak, D. F. (2012). Comparing teacher-directed and computer-assisted constant time delay for teaching functional sight words to students with moderate intellectual disability. *Education and Training in Autism and Developmental Disabilities,* 47(3), 280-292.

Collins, B., Evans, A., Creech-Galloway, C., Karl, J., & Miller, A. (2007). Comparison of the acquisition and maintenance of teaching functional and core content sight words in specials and general education settings. *Focus on Autism and Other Developmental Disabilities,* 22(4), 220-233.

Courtade, G., Lingo, A., Karp, K., & Whitney, T. (2013). Shared story reading, teaching mathematics to students with moderate and severe disabilities. *Teaching Exceptional Children,* 45(3), 34-44.

Erickson, K., Hanser, G., Hatch, P., Sanders, E. (2009). Research-based practices for creating access to the general curriculum in reading and literacy for students with significant intellectual disabilities. *Development Education Research,* 1-136.

Evely, M., & Ganim, Z. (2014). Poor processing speed. *Psych4schools.* Retrieved from http://psych4schools.com.au/excerpt/processingspeed.

Foreman, P. (2009). Understanding intellectual disability. *Education of Students with an Intellectual Disability,* 1-21.

Goldstein, H. (2011). Knowing what to teach provides a roadmap for early literacy intervention. *Journal of Early Intervention* 33(4), 268-280.

Guisepi, R. (1995-2006). Ancient Egypt, Hieroglyphics. *International World History Project*. Retrieved from http://history-world.org.

Hansen, B. D., Wadsworth, J. P., Roberts, M. R., & Poole, T. N. (2014). Effects of naturalistic instruction on phonological awareness skills of children with intellectual and developmental disabilities. *Research in Developmental Disabilities,* 35, 2790-2801. doi.org/10.1016/j.ridd.2014.07.011.

History of intelligence testing (2016). *Boundless Psychology,* 1-2.

Holdnack, J. (2010). Defining the role of intellectual and cognitive assessment in special education. *The Psychological Corporation,* 1-20.

Hudson, M., Browder, D., & Wakeman, S. (2013). Helping Students with Moderate and Severe Intellectual Disability Access Grade Level Text. *Teaching Exceptional Children,* 45(3), 14-23.

n2y (2016). Retrieved from http//www.inclusivetlc.com/n2y

Jacobson, L., Ryan, M., Martin, R., Ewen, J., Mostofsky, S., Denckla, M., & Mahone, E. (2012). Working memory influences processing speed and reading fluency in ADHD. *Child Neuropsychology,* 17(3), 209-224. doi:10.1080/09297049.2010.532204

Kelly, K. (2015). Processing Speech: What you need to know. *Understood for Learning and Attention Issues.* Retrieved from https://www.understood.org.

McGrew, K. S. & Evans, J. (2004). Expectations for students with cognitive disabilities: Is the cup half empty or half full? Can the cup overflow? *NCEO Synthesis Report,* 55.

Mahlburg, R. (2013). Reading and students with intellectual disabilities: Using the readers workshop model to provide balanced literacy instruction. 1-24.

Mangen, R. (2015). What is processing speed? Forest Heights Lodge. Retrieved from http://forestheightslodge.org.

Mechling, L., Gast, D., & Krupa, K. (2007). Impact of SMART Board Technology: an investigation of sight word reading and observational learning. *Autism Developmental Disorders,* 37, 1869-1882. doi.1007/s10803-007-0361-9.

Missouri Department of Elementary and Secondary Education. (2015). *Special Education Compliance Program Review Standards and Indicators,* 1-102.

n2y, (2016). Cloud-based learning for education. Retrieved from https://www.n2y.com/default.aspx

National Center for Education Statistics. National Assessment for Adult Literacy. Retrieved from http://nces.ed.gov/naal/kf_demographics.asp.

Orsolini, M., Melogno, S., Latini, N., Penge, R., & Confori, S. (2015). Treating verbal working memory in a boy with intellectual disability. *Frontiers in Psychology,* 6:1091. http://dx.doi.org/10.3389/fpsyg.2015.01091.

Poloczek, S., Buttner, G., & Hasselhorn, M. (2012). Relationships between working memory and academic skills: are there differences between children with intellectual disabilities and typically developing children? *Journal of Cognitive Education and Psychology,* 11(1), 20-38.

Public Law 94-142, retrieved from http://www3.nd.edu/~rbarger/www7/pl94-142.html.

Ruppar, A., Gaffney, J., & Dymond, S. (2015). Influences on teachers' decisions about literacy for secondary students with severe disabilities. *Exceptional Children,* 81(2), 209-226.

Ryan, J., Hughes, E., Katsiyannis, A., McDaniel, M. & Sprinkle, C. (2011). Research-Based Practices for Students with Autism Spectrum Disorders. *Teaching Exceptional Children,* 43(3), 56-64.

Smith, W.P., K12 Reader Reading Instruction Resources, (2015), retrieved from http://www.k12reader.com/what-are-sight-words/2/.

Special Education Rights and Responsibilities (2012). Disability Rights California, Retrieved from http://www.disabilityrightsca.org/pubs/504001Ch07.pdf on March 7, 2016.

Trezise, K. L., Kylie, M.G., Taffe, J. & Sheppard, D.M. (2014). Working Memory in adolescent males with Down syndrome and males with autism and intellectual disability: Implications for the classroom, *Journal of Intellectual & Developmental Disability*, 39(1), 24-34.

U.S. Department of Education. (2010). Archived: a 25-year history of the IDEA. Thirty-five years of progress in educating children with disabilities through IDEA. Retrieved from https://www2.ed.gov/about/offices/list/osers/idea35/history/idea-35-history.pdf.

U.S. Department of Education, (2007). Retrieved from http://www2.ed.gov/policy/speced/leg/idea/history.html

Van der Molen, M. J., Henry, L. A., & Van Luit, J. E. H. (2014). Working memory development in children with mild to borderline intellectual disabilities. *Journal of Intellectual Disability Research,* 58(7), 637-650.

Wakeman, S., Karvonen, M., & Ahumada, A. (2013). Changing instruction to increase achievement for students with moderate to severe intellectual disabilities. *Teaching Exceptional Children,* 46(2), 6-13.

Yaw, J., Skinner, C., Orsega, M., Parkhurst, J., Booher, J., & Chambers, K. (2016). Evaluating a computer-based sight word reading intervention in a student with intellectual disabilities. *Journal of Applied School Psychology,* (2012). 28(4), 354-366. doi.10.1080/15377903.2012.722181.

Your child can learn sight words with snapwords. (2016). Child 1st Publications. Retrieved from https://child1st.com/collections/snapwords.

Appendix A

MARYVILLE UNIVERSITY
ST. LOUIS

Guardian Informed Consent Form

As well as being your student's Special Education teacher, I am an Ed.D. candidate at Maryville University. As part of my program, I am going to conduct some research to determine if n2y or SnapWords is a better program to teach functional sight words to your students. I am entering into this research project with another employee from the Wentzville School District, Faith Gardner. She is a psychological examiner within the district. We would like to have your informed consent for your child to participate in the research. This participation is, of course, completely voluntary. Your student's assessments and evaluation will not be impacted in any way by your choice to allow your child to participate or not.

The overall purpose of this research is to determine how working memory and processing speed play into the acquisition of functional sight words. We are also trying to determine which of the school district's programs, n2y or SnapWords, is the better program to teach functional sight words.

Your student's participation will involve testing your student's working memory and processing speed using the WPPSI-IV or WISC-V, whichever instrument is appropriate for your student's age. Your student will also be given a pre-assessment for a baseline on the words they currently know from the n2y and SnapWords programs. Data points will be taken throughout the research, which will run from August through February of the 2016-2017 school year. Your student will be taught functional sight words using each of the programs throughout the school year, and data will be taken once a week to determine the growth in your student's acquisition of functional sight words.

There are no risks associated with this research. The possible benefits for your student from this research are potentially learning more functional sight words in a given school year. We are interested, just as you are, in helping your student reach their full reading potential. We know as well as you that reading is an essential skill needed in today's society.

We will safeguard your students' privacy and confidentiality in this study. We will report the data using pseudonyms without identifying information so that the privacy of the students will be protected and no one will be able to tell who an

individual could be. The data will be kept in a locked cabinet in Carolyn Samuelson's classroom and not shared with anyone. Carolyn will be the only person with a key to that cabinet, so the information should be safe. The electronic data, such as questionnaires and charts will be kept on a password-protected computer that is connected to a password-protected server. All data will become a part of your student's special education records because the data that is taken is part of your child's IEP goals.

The results of this study will be shared with our research advisor, members of our research class at Maryville University, Dr. Cain Superintendent of the Wentzville School District, and potentially the School Board of Wentzville School District, as well as being used for professional development activities at our school. We also may seek to publish our findings from the study in a professional journal. All results will be reported in a way that will protect the privacy of the students without the use of names or identifying information.

If you have any questions regarding this study, or if any problems arise, you may call either researcher, Carolyn Samuelson, at (636) 327-3846 and Faith Gardner, at (636) 327-6050 or Dr. Nicholas Strecker at (314) 629-9010. You may also ask questions, state concerns regarding your student's rights as a research subject, or express any feelings of pressure to participate by contacting: Chair of the Instructional Review Board at Maryville University, Dr. Peter Green 314.529-9428.

Maryville University investigators, and their colleagues who are conducting research, recognize the importance of your student's contribution to the research studies which are designated to improve educational learning environments. Maryville University investigators and their staffs will make every effort to minimize, control, and treat any complication that may arise as a result of this research.

By signing this form, you are stating that you have read and understand this form and have had the opportunity to ask questions about the research project. You agree for your student to participate in a study based on the information presented to you. You may choose to withdraw at any time without prejudice or penalty. You will receive a copy of this form, which will include the name and phone number of the researchers and the IRB at Maryville University, should you have any questions.

_____ _____

Sign Date