INSTRUCTIONAL COMPUTER PROGRAMS AND THE PHONOLOGICAL DEFICITS OF DYSLEXIC CHILDREN

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ABSTRACT

The 21st century is a time to contemplate the power of the technological advances that have occurred today. Computers have become idea engines- a tool used for thinking, performing, processing, and instructing people. No one understands or appreciates this phenomenon more than children suffering with dyslexia. These children's ability to learn or read at a fundamental level is severely deterred. The students' reading proficiencies are more apt to becoming a non-existent entity because of a devoid in their phonological awareness capabilities. Phonic perception is one of the main components in determining a child's success in academic reading. Dyslexic students need to learn the basics of phonics and recognize that words are made up of different sounds before they can start to read at an elementary stage. Dyslexic children must be at the heart of the learning process. One way to accomplish this feat is through computer assisted programs that provide these students with phonics instruction. "As technology has evolved so has the capacity of conventional computers and software to flexibly meet the needs of a wide range of users with disabilities" (Hawking pg. 10). Computers serve people and are as limitless as the human beings that operate them. The diversifying array of computer programs available today help aid in curtailing the phonological insufficiencies endured by dyslexic children.

CHAPTER I

INTRODUCTION

Increasingly, people have grown to rely on computers to sustain life's necessary functions. Computers can perform human-like qualities such as speaking, obeying commands, presenting indispensable information, and offering effective tutorial instruction. One can truly recognize the powerful responsibility this machine has in our society. As valuable as all its functions are, however, its most useful my be in the classroom. If a computer can aid in the enrichment of one's skills, then imagine what a computer can do for children who need to first develop their rudimentary skills before even thinking about augmenting them. No one can attest to this concept more than a child who is suffering from a reading disability. Reading serves as the central blueprint for all learning.

One such learning disability that affects "approximately 3% to 6% of all school-aged children" is known as dyslexia or "word blindness" (http://ericec.org/digests/e539.html). Dyslexia is a specific learning disability producing a "weakness in processing language based information and how that affects [one's] ability to learn" (dyslexic.com/index.asp?C=z&url=IND). The main hindrance that dyslexia produces is a lack of phonological awareness, the understanding that that words are made up of different sounds. "Phonics builds on that skill and teaches students to associate letters with those sounds and string them together to form words. For example the word

‘cat’ is read from three sounds (c-a-t)” (http://www.jwor.com/brochure.pdf). Dyslexia and other disorders affect one’s self-esteem, confidence, and motivational drive for academic success, which a child may have.

Children need to learn how to decode, recognize, and manipulate phonemes (smallest unit of speech) in spoken syllables and words in order to develop reading skills. “Phonemic and letter knowledge are the two best school-entry predictors of how well children will learn during first two years of instruction” (http://www.schwablearning.org/articles.asp?r=745).

Unfortunately, there is no cure for dyslexia but there is, however, an effective remedial solution. This is where computers can play an integral role and serve as a vital educational tool that are designed to provide children with phonological instruction to help them reach their full potential. Assistive computer programs “allows [dyslexic children] to capitalize on [their] strengths and bypass areas of difficulty” (http://www.schwablearning.org/articles.asp?r=286). Just a few weeks of phonological training can significantly help improve reading skills. “Research has shown that about 20 minutes a day, 3-4 times a week in phonemic instruction will result in dramatic improvement in reading capabilities” (http://www.orton-gillingham.com/orton-gillingham5.asp). The implementation of computer assisted instruction in the form of remedial computer programs can enhance learning experiences and offset the negative effects endured by dyslexic students by providing them with much needed support in their phonological learning deficits.

With the growing popularity of technology today, there is easy accessibility to a plethora of constructive computer programs that provide learning disabled children with phonological instruction. Dyslexic students are fortunate enough to be living within a modernized and digitalized world where there are successful programs on the market that are designed specifically to meet the needs and weaknesses of their learning deficiencies. In order for a computer program to be deemed as effective and beneficial it must utilize "a self-directed approach of [the development of phonetic skills [and allow each child to] perform at his or her own rate while automatically receiving the appropriate amount of practice needed for mastery" (http://www.jwor.com/brochure.pdf). The three most advantageous computer programs available today that help break down barriers between students suffering with dyslexia and the printed word are, *Dragon Naturally Speaking 8 Preferred, Kurzweil 3000,* and the *Language Tune-Up Kit.*

Dragon Naturally Speaking 8 Preferred is the most effective compensatory tool for students with dyslexia. It is a speech recognition program that allows students to speak into a microphone, which allows their words to appear on the computer screen. When the child either speaks his or her own words or reads a document, the computer will recite what is on the screen so the students can listen to how words should be phonetically pronounced. This permits students to focus on decoding words while also processing meaning. Pronunciation, context recognition, word usage and spelling is included for more than 42,000 active words. When a story is read

in this multi-sensory approach, a child has a better chance of hearing and recognizing the proper intonation of words. This type of computer program caters to all the basic foundations of a sound reading education such as improving one's pronunciation, generating reading fluency, and providing phonics awareness and familiarity. The advantage of this type of text-to-speech program is that it reinforces essential ideas using both sight and hearing. Dyslexic students are known to use different temporal regions of the brain, therefore, producing a weakness within their phonics recognition abilities but creating strength within their visual perception and stimulation capacities. If a dyslexic child used a talking computer program that allowed him or her to practice and strengthen their phonics abilities for six hours spread over four weeks, there would be a remarkable improvement in their reading, writing and spelling proficiencies.

The second program that aids in educating dyslexic children on the structure of words is *Kurzweil 3000*. It is known to be the leading developer in reading software for people with learning disabilities. *Kurzweil 3000* is program that adapts to the learning deficits of dyslexic students. It addresses language and literacy weaknesses by allowing students to hear passages read aloud to them to ensure phonics comprehension and allow them to acquire, utilize, and improve upon their phonetic capabilities. "The pronunciation of individual phonemes and syllables within words reinforces phonics development" (http://wwwurzweiledu.com/). Another benefit of *Kurzweil 3000* is a feature entitled "OCR, which means it can convert print into

electronic text. This allows students to scan any material they may find taxing into the computer and receive the immediate assistance they were in dire need of. *Kurzweil 3000* also adheres to the 'No Child Left Behind Act' (NCLB) of 2002 by presenting a multi-sensory and interactive format, which "provides both visual and auditory exposure at the sound, syllable, word, phrase, or sentence level" of the dyslexic child" (http://www.kurzweiledu.com/). Kurzweil 3000 caters to the five most critical reading areas identified by The Reading First Initiative, a major component of the NCLB Act. They are phonemic awareness, phonics and word study, fluency, vocabulary and comprehension.

Language Tune-Up Kit is based on the Orton-Gillingham Method. Orton Gillingham is "a technique of studying and teaching language, understanding the nature of human language, the mechanisms involved in learning and the language-learning processes in individuals". It's "approach is language-based, multi-sensory, structured, sequential, cumulative, cognitive, and flexible". (http://www.ortonacademy.org/approach.html). It helps children with language processing problems. *Language-Tune Up Kit* is a multimedia phonics program that is modifiable so it can accommodate the differentiating, individualistic skill levels each dyslexic student performs at.

The program offers an "audio recognition" section that emphasizes correlation between letter sounds, letter combinations, and word formations, and monitors a students' capability in an "auditory assessment", which gauges if the child is able to understand differences in letter and word sounds. The

student will receive up to 10 repetitions of each sound, letter, or word. If 80% is mastered, the lesson will then continue onto the next level but will always review what the student has learned previously. The program also questions students on the spelling of certain sight words since not all words conform to the phonetic spelling rules of the English language. The privilege of having such phonetic spell checkers is to ensure dyslexic students are not spelling basic words such as ‘was’ as ‘wose’. At the conclusion of the programs 87 lessons, the successful student will have the skills necessary to decode 85% to 90% of all words in the English language” (www.jwor.com/brochure.pdf).

CHAPTER II

REVIEW OF RELEVANT LITERATURE

Computers serve people especially children with learning disabilities. Computers can be used to match the student's pace. They are patient and will hold on to an idea for a long time. They do more complex tasks when students are ready to use them in more complex ways. (http://www.kidsource.com/kidsource/content/pc.gifted.html). Through the use of computer instruction, a child's confidence, motivation, and progression will all increase, which permits the dyslexic student to build upon their academic skills as well as their buoyancy. "Each new teaching point stretches him [or her] a little, while reinforcing at each stage all that has gone on before" (http://www.dyslexia-inst.org.uk/articles/prin_teach.htm). The analytical nature of computers is that it provides the students with a series of habitual practice to guarantee that the child has not forgotten what he or she has already learned. It is the computer directed instruction that allows students to develop automaticity and strengthen their phonological awareness capabilities and retain information longer. The better students understand the learning process, the better they will use technology (http://www.kidsource.com/kidsource/content/pc.gifted.html).

According to author Stephen Hawking and active participant of the ATA (The Alliance for Technology Advance) people with dyslexia can significantly improve their lives through the integration of computer instruction (Hawking pg. 15). Computers help

children with dyslexia by preparing them and teaching them skills for when they are placed within a standardized, regular curriculum so they gain the confidence to succeed and achieve their goals as well as dreams. Hawking's book is designed to meet the needs of dyslexic students by providing them with useful knowledge about certain computer programs, the powerful role computer instruction can have within the life of a dyslexic, and what a dyslexic should be looking for when choosing a computer program. Hawking's argues that a dyslexic students' temporal regions located within their brain remain inactivate. With the use of computers, however, these areas in the brain can be activated and start functioning normally, which will allow them to advance their phonological capabilities, which is a crucial component to understanding the world of literacy. The premise of Hawking's work was that with the use of a computer "a disability no longer has to mean that things cannot be done, it means that we can find new ways to get them done" (pg. 3). The role of computer integration is to support a dyslexic child's most common area of weakness which is their phonological awareness and provide them with the amazing ability to "access new things or old things in new ways, to unleash human potential, and to redefine power and control" by promoting self-advocacy: ("doing for yourself by gathering the information and support to make decisions and choices on your own, rather than relying on other people to make them for you" (pg. 9). The insufficiency of phonological skills can be easily accommodated to by the use of modifiable and customizable computer programs. Children suffering from dyslexia need to start thinking "of what can be rather than what is" (pg. 8).

Dyslexia not only affects students academically but psychologically as well. The book titled Learning Disabilities: Foundations, Characteristics, and Effective

Teaching promotes computer-assisted instruction with the use of software programs because the "computer is used to present tasks or performs other functions usually performed by a person" (pg. 163). Computers create an environment for students that promote interaction, reinforcement, validity, and control. Before dyslexic children can learn and inherit concepts, they first must be instructed on basic skills in order to develop a sound and foundational educational experience. Each dyslexic student has their own learning strategy that suits their capabilities and strengths best, which is why computer programs are essential because they can be adaptable to meet the most effective learning methods of individualized students. Computers are an "excellent means of modifying or adapting instruction to promote inclusion in general education settings" (pg. 163). A dyslexic student must learn the importance of phonological skills since it "plays an important role in acquisition of higher-order skills and influences children's reading" (pg. 163). In order for dyslexic students to master their phonological inabilities they must realize that reading is considered to be "the most intricate workings of the human mind" and therefore computers should be implemented to teach "the skills [needed in order] to understand how phonemes (speech sounds) are connected to print, the ability to decode unfamiliar words, the ability to read fluently, and the capacity to derive comprehension from the texts" (pg. 163).

Most dyslexic students are visual thinkers and do well when presented with a hands-on learning experience. Since computers have the ability to decrease the limitations on dyslexic children they are often referred to as Adaptive Technology (AT). AT includes "any item, piece of equipment, or system of products that is used to increase, maintain, or improve functional capabilities of individuals with disabilities"

(http://www.bridgemultimedia.com/clickinginclassroom.php). Computer application programs are an essential literacy tool in today's world because it has helped and will continue to help dyslexic students break free from the challenging chains of restrictiveness and constraining limitations. The main impediment for a dyslexic child is their weakness in phonological awareness since that is what creates the groundwork for a tangible, influential, and fervent education. "Phonics instruction teaches children the relationships between the letters of written language (graphemes) and the individual sounds of spoken language (phonemes), which will contribute greatly to a dyslexic students' ability to read, write, and spell" (http://www.nifl.gov/partnershipforreading/publications/reading_first1phonics.html). As a result dyslexic pupils are finally able to change the way they learn in order to accommodate their specialized needs, wants, and learning styles. Each student suffering from dyslexia has their own personal learning strategy and differentiating learning style. Adaptive technology programs allow students to "change how they interact with digitized materials by controlling it in a variety of ways to be heard, seen, and manipulated" (http://atto.buffalo.edu/registered/ATBasics/Foundation/intro/introdefine.php).

Some of the most favorable and successful AT programs on the market have been designed with the dyslexic students in mind are, *Penfriend XP, Spellcatcher 8, Clicker 5, E-books, Dragon Naturally Speaking 8, Kurzweil 3000, Language-Tune-Up Kit,* and *Inspiration.*

Penfriend XP helps dyslexic children write faster by predicting the next word they want to type by using an on-screen dictionary that allows the students to chose what word they wish to write from within the list that is being offered. The child can also hear the word read aloud if they are unsure of how to pronounce the word. This feature can assist dyslexic children with their phonological difficulties since the program highlights each word as it reads aloud the sentences, paragraphs, or stories. It also informs the students of how to properly correct punctuation and grammatical errors. The program addresses unique, individualized needs of the students by offering three essential features: 1) Word Prediction, 2) Speech Feedback, which reads words aloud from the screen, 3) On-screen keyboard, which eliminates the annoyance of glancing from the keyboard to screen. The program also works with Microsoft Word and reads aloud any word the child may have difficulties with and also offers synonyms for the words. These components let the students' manipulate the program in order to accommodate their learning styles and make the task of learning a less intimidating process and more of a rewarding experience.

Spellcatcher 8 is a talking computer program functions as a personal proof reader by reading aloud word from word what the student has just typed. This helps dyslexic students hear how certain words should be pronounced and it also makes them aware of any grammatical or punctuation errors they may have made. The process of having the computer read aloud reduces the strain of reading for those particular individuals who struggle with the task of reading long documents. *Spellcatcher 8* identifies an error by informing the student through an alarm sound, it then identifies the correct spelling from a suggested list, and allows the student the choice to either

hear the word read aloud or the student can search the program's dictionary to look up any unsure definitions. Spellcatchers are also multi-lingual, and can run independently with other applications and routinely checks the students' document for common dyslexic-type errors.

Clicker 5 is a software program developed by John Crick and commonly referred to as the "software for all abilities". The top half-screen is a word processor with toolbars. When the student types in the processor, a voice speaks what the student just typed. The voice highlights the words within the sentences, making it is easier for the students to follow along. If a pupil has trouble pronouncing a word, they can click on the word to hear a voice properly recite the word. The bottom half of the screen is called a clicker grid. When a dyslexic student clicks on the provided words or pictures they can create sentences or create their own stories since they learn best through pictorial visual stimulation. This feature of being able to create talking books helps keep the students actively involved within their own learning acquisitions. There is a microphone button that the pupil can press to record their own voice so when they want to showcase their story or proofread it, they can hear their own voice reading their creation aloud. Students learn to write properly and correctly and the program encourages the use of proper punctuation, and if they don't an animated voice will inform them that they need to add a period, comma, question mark, etc. *Clicker 5* supports whole word recognition, sentence structure and grammar, fluency, vocabulary and comprehension. This program is currently being used within 40,000 schools worldwide because it "promotes the inclusion of children of all abilities by creating

flexible products that can be tailored by teachers to the needs of individuals" (http://www.cricksoft.com/us/about/index.htm).

Another great assistive tool for dyslexics is *E-books*. An advantageous feature of *E-books* is that they are accessible through download on the Internet or one may purchase them on CD so that they can be compatible with one's computer. If the recorded story is purchased in a store, a regular print book accompanies the audio-book, which is also referred to as a CD. There are plenty of websites that allows students the opportunity to purchase or download an *E-book*. In particular, the website entitled *Recorded Books Rental* makes the process of immediately accessing *E-books* simple and easy and if a child does not have access to a computer to put their CD in, this site offers a section that sells CD-players or cassette players according to what type of audio book the student is interested in. Stories can be altered to meet the needs of learning disabled students by accommodating to their academic abilities. *E-books* can be bought at a reduced speed for those particular students that read slower due to their dyslexia. When a child decides to listen to the story at a leisurely pace, the student then has more of a chance to hear the pronunciation and intonation of the words.

The auditory feature of *E-books* offers studio recorded speech instead of synthesized speech which is usually hard to understand or depict. There are over 700 titles available to provide versatility and offer variety for the many diversified students and the stories also come with illustrations so dyslexic students can have visual stimulation as well. *E-books* are made to match traditional print texts found within the standardized classroom. *E-books* promote independent learning and the students have

the choice to read either the abridged or unabridged story. Some of the *E-books* even include a pull-out story guide that includes a practice worksheet. This type of multi-sensory learning fosters self-autonomy and permits the students to actively participate within their educational journey.

E-books serve as a promising supplementary aid to students with dyslexia because it helps minimizes the frustrations dyslexic students have with decoding text. The dyslexic pupil can even choose a classic novel that has been adapted and rewritten in a simpler, more understandable way yet has not been altered to the point where the main message behind the author's voice gets depleted. The student can even alter the font, size, and color of text as well as background to make the task of reading a little less taxing. Another advantageous feature is that a dyslexic student can transfer their *E-books* on CD's to their PDA's or cell phones by synching them with their computer so it can be portable and accessible if a student needs assistance or support with certain pronunciations or comprehension techniques from a teacher. This motivational unique style of reading greatly improves the students' pronunciation, vocabulary content, and phonic awareness, which are all critical foundational elements for reading. *E-books* can also be printed and provides easy access to websites that supply students with additional and supplementary information.

Dragon Naturally Speaking is an amazing assistive tool and tutorial aid for dyslexia students. This program was produced by the company Nuance and is known for being the most accurate speech recognition product ever developed. Dyslexic pupils can into their computer and their words will automatically show up in any of the

following applications: Microsoft Word, Excel, Corel Word Perfect, and all other windows applications. It even allows the students to listen to incoming e-mails or hear their type-written documents read back to them. Pupils can search URL's and links on the Internet with the simple task of a voice command. Students are allowed to speak their words and then hear it read back to them, which allows them to hear how the words should be pronounced and assists in developing their familiarity with phonological recognition. Dyslexic students often have difficulties with because of difficulties recognizing certain letters or numbers. The speaking feature and playback component gives the students the outlet of expression that they have been craving yet were too intimidated to convey their ideas to the teacher or to their fellow peers due to their disability. Since most students speak faster than 160 words per minute, but type less than 40 words a minute this program helps to make school work less of an exasperating struggle for dyslexic students (http://www.nuance.com/naturallyspeaking/preferred/). *Dragon Naturally Speaking* is tailored made to meet specific needs and it also allows students the chance to synch their digital reorder or Pocket PC into their PC and have their recording transcribed by the program. It comes with a microphone that cancels out any outside noises so students can clearly articulate what they want to say and it's 99% accurate, which means it rarely makes a spelling mistake and helps dyslexic students broaden their vocabulary. The last feature of this program is called "NBS" (Nothing but Speech), which filters out all of the "ums" and "ahs" that learning disabled students have a tendency of doing while speaking aloud.

Kurzweil 3000 "supports the main components of effective reading instruction" (http://kurzweiledu.com/files/NCLB.pdf). This computer application was specifically designed to meet the demanding needs and learning styles of dyslexic students. It addresses the areas that dyslexic pupils lack skills in such as reading, writing, and learning. It allows teachers to utilize a one-button scanning feature to scan story passages or tests and quizzes which gives the dyslexic child the opportunity to type answers or insert notes directly into the image of the scanned document. According to an article entitled "How Does Kurzweil 3000 Support Reading Instruction and No Child Left Behind?", this learning software "is widely recognized as the most comprehensive and integrated solution for addressing language and literacy difficulties". It is essential that pupils suffering from dyslexia are approached in a multi-sensory fashion so they are actively involved and are autonomous of their own learning experiences. Kurzweil accommodates this multi-faceted learning expedition by providing the students with printed or electronic text that appears on the computer screen and is accompanied by visual and auditory accessibility. It also supplies study skill tips and ideas as well as test taking tools designed to meet the individual needs of the students. It's an active learning process that allows teachers to gauge and monitor a student's weaknesses as well as strengths by being able to post questions within the program's comprehension story via voice, sticky notes, or text. Students can read along to sample readings of passages and repeat it as many times as needed and also be able to alter the speed of the computer's recitation according to their own individualized level of academic proficiency. This particular program adheres to four essential components of reading in which dyslexic students need support in: 1) Phonemic

Awareness and Phonics/Word Study: recognize the relationships between sounds and letters, word parts, and syllables, 2) Fluency: read text fluently and quickly, 3) Vocabulary**:** dictionary/thesaurus provide definitions and synonyms for new words, and 4) Comprehension: helps students identify main ideas and create graphic organizers. This program integrates the beneficial advantages of computers by allowing either students or teachers to create, deliver, or print electronic documents that were generated by the use of a scan feature component found within the program. The student can then have the opportunity to hear the computer read the story passage or test orally so they can become more attentive to phonological awareness.

Language Tune-Up Kit is a research-based remedial reading program designed for children, teenagers, and adults that is based solely on phonemic awareness, which is a huge learning deficit and downfall for students with dyslexia. This provides the child with great lesson plans that rely on repetition since consistency is the key for success. The computer's utilization of reinforcement helps build confidence and master literacy skills since dyslexic pupils have a short term memory. This program also provides ample opportunity for students to practice spelling and hear words properly pronounced. Another feature this computer application help aids in is the dyslexic's difficulty to spell sight words that do not conform to phonetic spelling rules such as spelling "fone" for "phone". Students can alter the sound volume, change screen colors, and designate a speed to match their differentiating learning styles. What makes this software applicable to dyslexic students is the fact that it is a multi-reading program based on the Orton-Gillingham Method. This is the "most researched technique devised to address the needs of a dyslexic pupil since 1930"

(http://www.jwor.com/faq.htm). It consists of a synthetic approach to teaching phonics and the basic elements of language. “Systematic structured phonic instructions result in a more favorable outcome in reading than does a content-emphasis (whole language) approach” (http://www.jwor.com/research.htm). The idea behind this program is to present the dyslexic child with a placement test, which determines the student’s reading skills and places the pupils in their appropriate starting lesson. It assists students by helping them learn and recognize words and blend sounds so they can sound out unfamiliar words. Students can be active learners and engage within an interactive world that builds their reading skills as well as phonological abilities. The program presents the dyslexic with a “controlled approach to reading instruction” and serves as the child’s personalized tutor (http://www.jwor.com/research.htm).

Inspiration is a program that it is used by students to brainstorm or generate ideas for a topic in order to devise an academic paper or create a graphic organizer such as a diagram or web. When the student begins to type their ideas or opinions, the program automatically builds a diagram consisting of the child’s perspectives and either reads them aloud to the them or lets them record their own voice so they can play it back. Inspiration provides ample opportunity for the dyslexic child to revaluate and access their faults as well as praise his or her strengths. This particular program caters to the various and varying learning styles of a dyslexic child. It helps organize writing and thinking skills during the students’ process of composing an essay by creating a multi-media experience for the child. It “helps bridge the gap between visual and verbal modes of expression” (http://inspiration.com/vlearning/research/index.cfm). Dyslexic students can learn the concept of phonics by creating graphic organizers that combine

pictures, text, and spoken words which leads to higher order thinking skills and phonological proficiencies. According to *Inspiration's* website, this program also "supports implementation of cognitive learning theories: dual coding theory, schema theory, and cognitive load theory". It is a customizable program that allows the students to implement their own personal preferences so they can work at their own leisurely pace without feeling overwhelmed. It meets the specific needs of each and every dyslexic student and helps to not only improve their performance but also assist in developing phonological proficiencies across the curriculum. This type of modifiable program increases the dyslexic student's achievement especially since it can be integrated within the subjects of Language Arts, Science, History, and Social Studies.

Dyslexia is an intricate and challenging disorder that must be addressed immediately in order to ensure a promising and fruitful future. Instructional computer programs can forever alter the conventional manner in which teachers teach and students learn. "Before children can learn to read print, they first must develop an awareness of how the sounds in words work" (http://www.nifl.gov/partnershipforreading/publications/reading_first1phonics.html). Phonological awareness is an essential learning skill that is devoid within dyslexic children but with the utilization of computers, they are presented with the opportunity to prosper, strive, and develop.

Disabled readers do not readily acquire the alphabetic code when learning to read due to deficiencies in their progression of phonological processing. Dyslexic students must be instructed on the rules and applications of phonics. Systematic phonics instruction, like the one received from computers, produces a more advantageous

outcome in reading than does a context-emphasis better known as Whole Language Approach

(www.dyslexic.com/database/articles/techoverview.html). Just as computers are continuously changing on an everyday basis so are the needs and demands of dyslexic students. Dyslexic students should receive instruction that not only relates to their interests but also intrigues them and makes them want to foster independent thinking skills and confidence. Computers provide immediate feedback and contain Universal Access features, which means that computer programs present alternate ways, with multiple options for student control. For people without disabilities, technology makes things easier. “For people with disabilities, technology makes things possible” (http://www.schwablearning.org/Articles.asp?r=286).

Schools have become a child’s second home; a place where they can grow, strive, develop, and expand their horizons in hopes of a better tomorrow. In order for children to become productive, fruitful learners, a school must provide an educational foundation which provides students with the necessary learning tools they need in order to become successful. It is no small feat to educate the children of the future and the leaders of tomorrow. As any pre-service teacher knows, they are about to embark upon an arduous journey and will encounter a plethora of experiences along the way; some which are challenging and some which are rewarding. When students are in the classroom, they magically transform into clay, eagerly waiting to be molded into successful independent learners, students, and people. In a utopian school all students would learn at the same pace and rate and understand, retain, and acquire a vast quantity of knowledge. We live in a world of disabilities, however, a place where

students are deprived pf the wonders of learning and of self-confidence due to factors over which they have no control.

It is a harsh and cruel reality that in today's world there are so many innocent children that are plagued by the devastating effects of learning disorders. There is one specific learning disability, however, that obstructs students from developing their rudimentary learning skills. When a child does not have a sound educational foundation, it can hinder the way they perceive themselves not only as students but also as human beings.

Dyslexia is considered to be a specific learning disability, which means that students interpret information differently which affects a particular area or a particular process. This process hinders a student from acquiring the necessary literacy skills they need in order to flourish within school as well as in their everyday life. Dyslexia is a complicated disorder, in that, the students are considered to be of or in a the conventional classroom setting. It impedes the student's capability of "processing visual or auditory information; holding that information in working memory and with kinesthetic awareness, co-ordination and automaticity". These effectual consequences impede academic progress across a variety of subjects and infringe upon one's ability to properly read, spell, and write (www.dyslexic.com/database/articles/whatisdyslexia.html).

The variance of computer resources offered to students is immeasurable and permit dyslexic challenged pupils to enter a world where they feel safe, comfortable, and optimistic. Computer application programs provide dyslexic students with the assistive technology they need in order to succeed and conquer their phonological learning deficiencies. In order to fathom the impact computer instruction can have on a

learning disabled child, one has to realize and recognize the complications and challenges dyslexia can pose upon a student. The implementation of computer assisted instruction in the form of remedial computer programs can enhance learning experiences for dyslexic students by providing them with much needed support in their phonological learning deficits.

Educators need to learn the importance of assistive technological utilization and how it can help offset, or reduce the negative effects endured from dyslexia. In order to ensure proper employment of computer resources, an instructor must first dissect the very essence and core of dyslexia. The resources listed below provides one with a better understanding of what this complicating disorder entails and how it impinges upon all aspects of a child's daily life both academically as well as personally.

Dyslexia is a learning disability that causes many problems with literary skills such as reading, writing, spelling, as well as other academic areas that require perceptive intellectual thought processes like memory, concentration, and organization. It can occur at any level of intellectual ability, which is also commonly referred to as "The Matthew Effect" (http://www.dyslexia-inst.org.uk/faqs.htm#What_is). According to the Dyslexia Institute, dyslexia is a congenital, developmental condition which manifests itself through neurological anomalies within the brain. It is considered to be a "weakness in the processing of language-based information" (http://www.dyslexia-inst.org.uk/faqs.htm#What_is). The only positive aspect of this particular type of brain anomaly is that dyslexic students possess exceptional visual, spatial, and lateral thinking abilities, heightened and catered to by the implementation of computer

programs. Sixty percent of dyslexic students have phonological difficulties such as sorting out the sounds found within words, their main weakness, while also battling difficulties in reading, writing, and spelling (http://www.dyslexia-inst.org.uk/faqs.htm#What_is). Computer software applications offer dyslexics a multi-sensory experience that includes all the senses (ie: looking, saying, and doing). It is through this that a dyslexic child learns more quickly as well as reads and spells more correctly and fluently while also developing phonological skills.

CHAPTER III

CONCLUSION

Reading is not a natural act, it must be learned. Children with dyslexia must be taught in a modifiable manner that instructs them on specific decoding and word recognition. A staggering statistic that supports this concept is that "15% to 20% of children do not learn to read successfully unless they receive direct instruction in phonological awareness" (http://www.nifl.gov/partnershipforreading/publications/reading_first1phonics.html). According to author G. Reid Lyon in his article entitled *Why Reading is not a Natural Process?* in order for children to learn to decode and read printed English, they must be aware that spoken words are composed of individual sound parts termed phonemes. This is what is meant by phonetic awareness.

Children with dyslexia now live in a world where computers are now used to rewire and restructure parts of the brain that do not function as sufficiently in learning disabled people. New York Times Reporter, Pamela Mendels, writes in her article titled Push *for Computers in Classrooms Gathers New Foes*, that "the conventional wisdom in education policy circles in recent years has held that children need to be introduced to computers and technology should be a strong presence in their school lives". According to the website LD Online, "research shows that programs utilizing multisensory structured language techniques and that support the importance of phoneme awareness and phonics development can help [students with dyslexia] learn to read. Computer application programs allow dyslexics to feel a sense of normalcy for

the first time. “When a dyslexic child is assisted by today’s technology they will be able to learn at a closer, if not the same rate that a non-disabled child will learn at (http://tiger.towson.edu/~ljohns15/research/paper.htm).

While there is no medical remedy for dyslexia, there are some remedial intervention strategies that can be implemented within the classrooms. These strategies serve as the only hope these dyslexic students have in achieving any progression during their educational quest. The key to reinforcing the learning process is to help aid dyslexic pupils in developing independent thinking skills and the confidence to utilize their new-founded proficiencies.

Residing within a society driven by technology, the answer to alleviating the complexities and challenges of dyslexic students, lies within the world of adaptable and modifiable computer programs. This software can help assist them in breaking down barriers that prevent them from attaining their full learning potential. Implementing the use of Adaptive Technology enhances learning experiences for dyslexic students by providing them with much needed support in their phonological deficits. Phonological awareness is the ability to “segment words into their constituent sounds, rhyming words, and blending sounds to make words”. (http://www.kidsource.com/kidsource/content2/disability.phonological.html. Students must be able to manipulate the sounds of language which are composed of Phonemes, which are the smallest units of sound. The technological advances of today are encompassed by a plethora of computer programs that allow dyslexic students to learn independently, passionately, confidently, and eagerly. These programs provide them

with a sense of self that permits them to become active participants within their own learning expenditure.

Dyslexic students need to establish a solid foundation in their phonemic awareness capabilities before they are able to develop, fortify, and apply their reading skills in language literacy. According to the article “Why Reading is not a Natural Process” written by G. Reid Lyon, “one of the best predictors of early reading achievement is an awareness of the sound bites (phonemes) in a spoken word”. “If our children cannot read, they are on the road to academic failure. Teaching children to read must be our highest priority” (http://orton-gillingham.com/orton-gillingham2.asp). The arrival of high performance, adaptable computer programs leave dyslexic children standing at the beginning of a more promising and optimistic journey towards a better future. Computer assisted instruction serves as a necessary learning tool that will reduce the negative symptoms felt by dyslexics by providing assistance and modifiable instruction in their phonological learning shortfalls.

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