

2010

# Methods to Improve Reading Skills in Children with Dyslexia, Autism and Other Common Learning Disabilities

Jacqueline F. Klueh  
*Fort Hays State University*

Follow this and additional works at: [http://scholars.fhsu.edu/liberal\\_studies](http://scholars.fhsu.edu/liberal_studies)



Part of the [Medicine and Health Sciences Commons](#)

---

## Recommended Citation

Klueh, Jacqueline F., "Methods to Improve Reading Skills in Children with Dyslexia, Autism and Other Common Learning Disabilities" (2010). *Master of Liberal Studies Research Papers*. 12.  
[http://scholars.fhsu.edu/liberal\\_studies/12](http://scholars.fhsu.edu/liberal_studies/12)

This Research Paper is brought to you for free and open access by the Graduate School at FHSU Scholars Repository. It has been accepted for inclusion in Master of Liberal Studies Research Papers by an authorized administrator of FHSU Scholars Repository.

Methods to Improve Reading Skills in Children with Dyslexia, Autism and Other  
Common Learning Disabilities

Jacqueline F. Klueh

Fort Hays State University

## Abstract

Methods to Improve Reading Skills in Children with Dyslexia, Autism and Other  
Common Learning Disabilities

The purpose of this paper is to explore methods to improve reading skills in children with common disabilities. Initially the paper will begin by defining key concepts and terms, including fMRI, fMRS, SBRR, classic autism, Asperger's, dyslexia and the poor reader. An explanation of the application of fMRI and fMRS as a tool to detect dyslexia and autism to identify the struggling reader will be included. The paper will explore how the brains of students that have dyslexia, autism or are poor readers function while performing a phonological task. It will provide an overview of how students that read well learn to read based on the scientifically based reading research method (SBRR) consisting of phonemic awareness, phonics, fluency, vocabulary, and comprehension. Also included are explanations for how to teach the learning disabled and poor reader to improve reading skills utilizing information obtained from an fMRI and fMRS. The paper concludes with classroom activities that can be tailored to assist students who are either autistic, dyslexic, or have undeveloped reading skills.

## Methods to Improve Reading Skills

### Methods to Improve Reading Skills in Children with Dyslexia, Autism and Other Common Learning Disabilities

Teaching students to read requires the students to obtain phonological awareness skills. Students that struggle to learn to read fluently often have a diagnosed or undiagnosed learning disability or are poor readers that have had little exposure to reading in the home before prekindergarten. Early intervention is instrumental in teaching students to develop reading skills and become fluent readers. With the help of functional magnetic resonance imaging (fMRI) and functional magnetic spectroscopic imaging (fMRI), students with such problems can be identified while performing a phonological task during the test. Then, reading interventions can be implemented to help the struggling students improve reading skills. It is necessary to begin by defining the terms and concepts used in this paper before discussing reading intervention. A

The paper will provide an overview of how students that read well learn to read based on the scientifically based reading research method (SBRR) consisting of phonemic awareness, phonics, fluency, vocabulary, and comprehension. Also included are explanations for how to teach the learning disabled and poor readers to improve reading skills utilizing information obtained from an fMRI and fMRS. The paper concludes with classroom activities that can be tailored to assist students with reading who are autistic, dyslexic, and have undeveloped reading skills.

## Methods to Improve Reading Skills

### **Defining Important Terms and Concepts**

#### **Definition of fMRI**

Functional magnetic resonance imaging (fMRI) uses MRI equipment to detect changes in the brain, cerebral metabolism, and blood flow while processing information acquired during reading. Algoe (2010) explains the process of fMRI

Functional brain mapping with magnetic resonance imaging (MRI) is a rapidly growing field that has emerged in only the past several years. Functional MRI (fMRI) is the use of MRI equipment to detect regional changes in cerebral metabolism or in blood flow, volume or oxygenation in response to task activation. The most popular technique utilizes blood oxygenation level dependant (BOLD) contrast, which is based on the differing magnetic properties of oxygenated (diamagnetic) and deoxygenated (paramagnetic) blood. These magnetic susceptibility differences lead to small, but detectable changes in susceptibility – weighted MR image intensity. Relatively low signal-to-noise ratio (SNR) of the (BOLD) effect, head movement, and undesired physiological sources of variability (cardiac, pulmonary) make detection of the activation-related signal changes difficult. (p.1)

fMRI is a technique that allows a team of professionals to see inside the brain, without having to surgically cut into the brain or use x-rays. When the brain is functioning or working on a task there is normally an increase of blood and oxygen in the brain. An fMRI can detect and measure the chemical differences that occur in the brain while a person is reading or processing information (Sanders & Orrison, 1995, pp. 236 -

## Methods to Improve Reading Skills

239). The test participant must keep head movement to a minimum for the test to be accurately read.

### **Definition of fMRS**

Functional magnetic spectroscopic imaging (fMRS) measures the level of chemicals in the brain while a person is processing information. The brain reacts chemically while processing information. For example, when reading words that are similar- like *to*, *two* and *too* - and trying to decide whether they mean the same thing or different things the chemical levels in the brain change due to metabolism. There is normally an increase in metabolism in the area of the brain that is processing information while performing the task of reading. The increase in different chemicals is represented by wavelengths. fMRS is used with fMRI to detect both chemicals and changes of chemicals in the brain; fMRS detects the chemicals in the brain while fMRI detects the changes in the levels of the chemicals in the brain (Sanders & Orrison, 1995, pp. 236 - 239). The two tests work in conjunction with each other.

fMRI and fMRS are windows into the brains of people with learning disabilities. Educators are just beginning to understand the specific problems in the brain that lead to difficulties in learning to read. Using information from an fMRI and fMRS will change the way educators approach how reading is taught to people with learning disabilities including, but not limited to dyslexia, classic autism and Asperger's disorder.

### **Definition of Dyslexia**

Dyslexia is an inherited disorder that hinders those with the disorder from learning to read or to become a fluent reader. Dyslexia sets up proverbial road blocks to reading, spelling and writing because it causes an abnormal processing of words.

## Methods to Improve Reading Skills

“Dyslexia is a language learning disorder that results in deficits in reading, spelling and writing” (Balise, Black, Nussbaum, Oakland, & Stanford, 1998, p. 140). Often people joke about transposing letters or numbers, saying *I must be dyslexic*; however, this illustrates a common misconception. Dyslexic individuals do not see or write backwards nor do they always transpose numbers. Their problems are directly related to the connection between seeing words and producing the sounds they make—they have problems with decoding the sounds that make up words. Individuals with dyslexia have problems with the phonological process of sound – symbol awareness (Donnelly, 2000, p. 23). Dyslexia affects an individual’s ability to read by interfering with his or her ability to understand sounds or recognize words’ meaning.

In the past, it was theorized dyslexic individuals processed language information in different parts of the brain than good readers; now with fMRI and fMRS this can be seen. The physical structure of the dyslexic individual’s brain does not look different from the brain of a normal reader to the naked eye but when viewed from an fMRI or fMRS there are distinct differences. “People with dyslexia have different levels of brain activity and connections in the language area than people without dyslexia” (Narayana & Xiong, 2003, p. 5). Though dyslexia is a problem with processing language, individuals with dyslexia are just as intelligent as individuals without dyslexia. “Dyslexia is considered a learning disorder not because people that have it are less intelligent, but because they understand words and language differently than others do” (Donnelly, 2000, p. 6). Often people misunderstand dyslexia and think dyslexic individuals are not as intelligent; this often leads to low self-esteem in dyslexic students. Low self-esteem can aggravate a dyslexic student's problems, creating a vicious circle. People with dyslexia

## Methods to Improve Reading Skills

need to know they learn differently from other people and there is nothing wrong with that; educators need to understand this too and support their dyslexic students. Students with dyslexia must have organization to develop good study skills (Donnelly, 2000, pp. 1 – 9). Helping the dyslexic student learn to organize their notes and keep an assignment journal can help the student to be successful in school.

In the United States, fifteen to twenty percent of the population has a learning disability. Of those, seventy to eighty percent have dyslexia. Dyslexia is the most common learning disability seen in schools (Balise et al, 1998). These statistics show dyslexia affects literally millions of people around the world. As common as dyslexia is, people are still not familiar with it.

Parents often wonder just how their children inherited dyslexia. “Researchers have determined a gene on the short arm of chromosome #6 is responsible for dyslexia. That gene is dominant, making dyslexia highly heritable. It definitely runs in families” (Bright Solutions, 1998, para. 13). If a parent has dyslexia the chances are that one or more of his or her children will have the same gene. According to the Dyslexia Association (2000), there are common signs of dyslexia to watch out for in preschool children. Dyslexic children may exhibit the following signs:

- May talk later than most children
- May have difficulty pronouncing words, i. e., *busgetti* for *spaghetti*, *mawn lower* for *lawn mower*
- May be slow to add new vocabulary words
- May be unable to recall the right word
- May have difficulty with rhyming

### Methods to Improve Reading Skills

- May have trouble learning the alphabet, numbers, days of the week, colors, shapes, how to spell and write his or her name
- May have trouble interacting with peers
- May be unable to follow multi-step directions or routines
- Fine motor skills may develop more slowly than in other children
- May have difficulty telling and/or retelling a story in the correct sequence
- Often has difficulty separating sounds in words and blending sounds to make words. (Dyslexia Association, 2000)

Dyslexic students entering kindergarten and first grade may exhibit the following signs:

- Has difficulty decoding single words (reading single words in isolation)
- May be slow to learn the connection between letters and sounds
- May confuse small words – *at/to, said/and, does/goes*
- Makes consistent reading and spelling errors, including:
  - Letter reversals – *d* for *b* as in, *dog* for *bog*
  - Word reversals – *tip* for *pit*
  - Inversions – *m* and *w*, *u* and *n*
  - Transpositions – *felt* and *left*
  - Substitutions – *house* and *home*
- May transpose number sequences and confuse arithmetic signs (+ - x / =)
- May have trouble remembering facts
- May be slow to learn new skills; relies heavily on memorizing without understanding

## Methods to Improve Reading Skills

- May be impulsive and prone to accidents
- May have difficulty planning
- Often uses an awkward pencil grip (fist, thumb hooked over fingers, etc.)
- May have trouble learning to tell time
- May have poor motor coordination. (Dyslexia Association, 2000)

It is important for teachers and parents to observe their children and get them the necessary help in reading instruction if they are struggling to learn to read fluently. If children are given help early - when they are in kindergarten or first grade - they will be more likely to succeed; with each passing year the success rate goes down. According to researchers at Yale University, three-quarters of students who are poor readers in third grade will remain poor readers in high school (Shaywitz, Moody and Shaywitz, 1997).

Parents are encouraged to watch for warning signs of dyslexia, and other learning disabilities such as classic autism and Asperger's disorder.

## **Definition of Classic Autism**

Classic autism, as it is traditionally referred, is actually a part of a range of autism spectrum disorders. Autism is the most common of all spectrum disorders. A developmental disorder, autism normally begins within the first three years of life. Autistic children engage in odd behaviors in which typical children do not engage. Autism is one of the severest pervasive developmental disorders affecting many people in the United States. People with autism generally exhibit difficulties with the normal development of the part of the brain that controls social interactions, cognitive function

## Methods to Improve Reading Skills

and communication skills (Wiseman, 2006, pp. 2 - 8). This lack of development may be manifested in many and possibly all of the following ways:

- limited social interactions, often withdrawn
- difficulty with verbal and non-verbal communication skills or lack of communication
- limited interests, difficulties with play and leisure activities
- repetitive behaviors
- numerous physical ailments, feeding disorders, digestive disorders, epilepsy, asthma and other common illnesses
- sensory integration dysfunction
- sleep disorders. (National Institution of Neurological Disorders and Stroke, 2009)

Autism is diagnosed four times more often in boys than girls. Its prevalence is not affected by race, region, or socio-economic status. Since autism was first diagnosed in the United States, the occurrence has climbed to an alarming one in 150 people countrywide (National Institution of Neurological Disorders and Stroke, 2009). There is no cure for autism but with treatment autism can be managed. “Although the majority of initial diagnostic and treatment efforts were rooted in work conducted by physicians, the responsibility in a large part has shifted to the schools” (Reid, Hresko & Swanson, 1991, p.70). Schools provide the treatment setting for learning disorders of school-aged children, including children that are diagnosed with Asperger’s disorder and dyslexia as well as numerous other learning disabilities.

## Methods to Improve Reading Skills

### **Definition of Asperger's Disorder**

Asperger's disorder is also an autistic spectrum disorder and sometimes is considered high-functioning autism. Asperger's Disorder, its diagnostic name, is also commonly referred to as Asperger's Syndrome. Asperger's actually shares some similarities to classic autism without the severe decline in cognitive function. Until 1994, there was not a clear definition for Asperger's. Because of this, there was some flexibility in the way technicians and doctors labeled and diagnosed Asperger's in children. Some school systems had a difficult time providing services to children with Asperger's since these children often did not have an official diagnosis. Since 1994 schools have been better able to serve these children (National Institution of Neurological Disorders and Stroke, 2009).

Children with Asperger's generally exhibit symptoms around the age of three, yet some exhibit symptoms sooner. Since this happens at a later age than children with the classic form of Autism, children with Asperger's seem to retain their early language skills, making it feasible to increase their reading skills. According to the National Institute of Neurological Disorders and Strokes (2009), boys are three to four times more likely to be diagnosed with Asperger's. Generally other family members will have symptoms as well. According to Klin and Volkmar (1995), it is estimated that two out of every ten thousand children will be diagnosed with Asperger's. Common signs of the syndrome include:

- expert knowledge about favorite subjects, intense absorption in circumscribed topics such as weather, television, movies

## Methods to Improve Reading Skills

- speech may be monotone, a lack of rhythm or odd inflection, poor nonverbal skills
- unable to modulate speech
- isolated due to poor social skills and narrow interests, little ability to form friendships
- developmental delays with motor skills
- paucity of empathy
- naïve, inappropriate, one-sided social interactions
- clumsy and ill-coordinated movements. (National Institution of Neurological Disorders and Stroke, 2009)

With help from an occupational therapist students with Asperger's can learn to be successful in school. "In a school setting, the occupational therapist helps children with basic sensory, motor, neuromuscular, and/or visual skills" (Lawton, 2007, p. 61). While occupational therapists help children with Asperger's disorder understand social behaviors, a reading specialist can work with them to develop reading skills based on the Scientifically Based Reading Research (SBRR) method of instruction.

### **Definition of SBRR**

SBRR employs systematic and empirical methods of instruction and involves rigorous data analysis. SBRR includes phonemic awareness, phonics, fluency, vocabulary, comprehension and text observations. Effective reading instruction must also include scaffolding, increased student engagement and varied instruction (Jefferson & Sweet, 2005, p. 22). These skills should be taught in a well thought-out logical sequence.

## Methods to Improve Reading Skills

Goals and objectives should be clearly defined; students should know what is expected of them. Providing opportunities for students to comprehend and master new skills can be achieved by using multiple activities within a lesson. Assessments should be designed to evaluate whether students have achieved new skills in reading (Tompkins, 2007). Utilizing these methods will allow educators to reach students with all forms of learning disabilities.

### **Developing Reading Skills of All Students Regardless of Ability**

As many educators know, trying to meet students' individual needs is an onerous task. Reading instruction should be tailored to each student's individual needs. Many children find learning to read difficult, frustrating and complicated. The task is even greater for a teacher of a student diagnosed with a learning disability.

Children who are poor readers compared to children who are good readers have a disruption in a part of their brain that impairs reading phonetically. An fMRI and an fMRS of the brain can show a child has a biological impairment of the brain. The changes in the brain point to a part of the brain that connects the visual cortex and the visual association areas in the language regions of the superior temporal angus. These tests are fascinating: they show the decreased activity in dyslexic readers, and they show the autistic student does not use the deep areas of the brain to process information (Sanders & Orrison, 1995, pp. 236 - 239).

When children are learning to read they discover how sounds represent letters and words. Words are made up of phonemes; individual sounds. The English language has more than 44 sounds and 750,000 to 1,000,000 words. Children learn to read by hearing these words and sounds. A child with a learning disability struggles to make these

## Methods to Improve Reading Skills

connections while a good reader makes clear connections between sounds and words (Tompkins, 2007 pp. 7 -8). It is important to understand each student's skill level and what is actually causing the disconnect that is impairing his or her ability to read.

Diagnostic testing, such as fMRI and fMRS, can help to reach that goal.

### **What can fMRI and fMRS tell us?**

fMRI and fMRS are tools that enable technicians to view how the brain functions. These tools can be used to observe how the brain works while it is processing information when an individual is reading. It has long been thought that there are differences in the brains of people with learning disabilities compared with those without. Now, fMRI and fMRS can be used to show that there are biological changes in the part of the brain that connects the visual cortex and the visual association areas in the language regions of the superior temporal angus (Sanders & Orrison, 1995, pp. 236 - 239).

In children who are poor readers, it can be shown that there is a disruption in a part of their brain that involves reading phonetically. An fMRI and an fMRS can show the area of the brain that has the impairment. According to Richards, Ayward, Berninger, Fields, Parsons, Richards, & Nagy (2006) “both of these techniques are noninvasive” (p. 56). Though the tests are noninvasive, they are not without challenges. Each test requires time and preparation since the participants must be performing a task such as reading, and there is the evaluation process that occurs after the tests. Children who have trouble reading are often under stress. Having a test that is non-invasive is important because a test should not cause additional stress to the child. Since the test is non-invasive, there are no serious side effects.

## Methods to Improve Reading Skills

The term 'functional' in reference to fMRI and fMRS is important: it means the test is given to individuals who are actively performing tasks while they are being tested. This allows the test to record what is happening in the brain while it is functioning. The results must be interpreted by a team consisting of psychologists, educators, doctors and technicians (Richards et al, 2006). A prime example is with regards to dyslexia. These tests show dyslexia is a brain-based disorder. Because there is a biological basis for dyslexia it may not be cured but there is treatment consisting of phonological tasks to help dyslexic students learn to read. A second example is autism. An fMRI of the brain indicates that children with Asperger's Syndrome have an area of the brain that does not function in the same way as a child without autism (Just, Cherkassky, Keller, Kana & Minshew, 2006, pp. 1 – 19).

The information obtained from fMRI and fMRS will allow educators to work with greater effectiveness with individuals with reading disabilities. Forming test groups to explore the effectiveness of fMRI and fMRS is essential to scientist and educators.

### **Test group of fMRS and fMRI of dyslexic students**

To successfully pinpoint and understand the impact of fMRS and fMRI testing on students with learning disabilities, two test groups were assembled. One test group was composed of eighteen children with dyslexia - five girls and thirteen boys. A second test group was formed consisting of twenty one children without. The groups were formed to demonstrate the difference in the brains of people with and without dyslexia. Two scans were performed. One was before and one was after the children received instructional treatment for several weeks. During the scan the children performed a phoneme mapping task, deciding if letters in a pair of made up words that were pronounceable and could

## Methods to Improve Reading Skills

replace real words. The test revealed that the group of able-reading students activated a large region involving the angular gyrus, supramarginal gyrus and the posterior portions of the superior temporal gyrus. In contrast, dyslexic readers manifested a relative under activation in the posterior region and an increased activation in the inferior gyrus and the middle front gyrus bilaterally (Shaywitz, 1998, pp. 307 - 312). The information obtained during the two scans was used to see the difference in the two set of test groups.

The decreased activation in the posterior region and increased activation in the inferior gyrus and middle front gyrus will not change with reading intervention (Just et al, 2006, pp. 1-19). Therefore dyslexic students need to be taught how to read by making other connections in the brain by using learning techniques in the reading classroom that can help them to learn how to decode words or sounds. Helping students learn to read is a complicated task. Understanding why they cannot read can make all the difference in reaching out to students.

As indicated earlier, words are made up of phonemes, which are individual sounds. Good readers can manipulate these sounds, but poor and dyslexic readers cannot. Poor readers cannot manipulate and break the letters down into sounds; they struggle with phonological awareness (Ruetzel & Cooter, 1992, p. 33). The difference between the poor reader and the dyslexic reader is that a poor reader has an area of the brain that is not activated but can be activated with exposure to more reading and working on phonological awareness. A poor reader can increase his or her reading skills with more reading exposure and reading instruction and with time become a fluent reader (Just et al, 2006, pp. 1-19). A dyslexic reader, in contrast, continues to demonstrate a relative under-

## Methods to Improve Reading Skills

activation in the posterior region and an increased activation in the inferior gyrus and middle front gyrus before and after reading intervention (Just et al, 2006, pp. 1-19).

### **Impact of brain research in dyslexia**

Functional magnetic resonance imaging and spectroscopic imaging studies indicate that people with dyslexia do not use the same part of their brain when reading as good readers do. Good readers consistently use the same part of their brain when they are reading. People with dyslexia do not use that part of their brain, and it appears that dyslexic readers are never consistent in the area of the brain they use, making reading less efficient when compared to a good reader. The fMRI and the fMRS imaging indicate that there are two differences in the brain in regards to reading. There is a structural difference in the lobes of the brain that inhibits the reading process. There is also a difference in the activity of the brain. There is a slow development of the temporal cortical areas, which leads to problems in forming memory formations of objects (Castle, 1997). Since words are seen as an object or a picture by the brain, this may be a key reason for dyslexia. Words can be broken down into letters which can be further broken down into sounds, but pictures cannot be broken down into individual sounds. Knowing that the activity is different is important, and showing which areas of the brain are activated and which areas of the brain are not activated is equally important. The brain processes visual and auditory information. Dyslexic students cannot take the component of a word or words and put them together in a sentence. This inability makes it difficult for these students to comprehend long sentences or passages. Evidence suggests their eye movement makes it hard to track words on a page (Castle, 1997). It has also been discovered that these students cannot keep up with the large amounts of information that

## Methods to Improve Reading Skills

they are seeing due to the eye and brain not working together. The information they are reading gets mixed up, making no sense to the student (Castle, 1997). Since this occurs, they have trouble with morphology -- understanding how letters join to form words.

Areas of the brain that are activated during the phonological processing task have a larger blood flow. According to Shaywitz, Shaywitz, Mencl, Constable, Pugh, Holahan, Machonie, Fulbright, Skudlarski, Fletcher, Lyon & Gorel (2003) "the area of the language network in the left temporal, parietal, and occipital lobe is under-activated in people with dyslexia, while the frontal areas over-activated" (p. 27). This might explain why people with dyslexia often excel in areas controlled by the right side of the brain, such as art, computer graphics, theater, athletics, and other creative outlets.

Knowing that a dyslexic individual uses both hemispheres of the brain is important in developing teaching methods for dyslexic students. One of the main findings of this research is that the dyslexic student has a deficit in phonological tasks, thus prohibiting the student from learning to read as quickly or as well as students without dyslexia. Students that are learning to read must be able to hear individual sounds that make up words and store these words in their memory to use later when they are reading. Fluent readers are able to quickly recall these words from their memory; dyslexic readers cannot. Phonological deficits have been identified as the main cause of reading difficulties. This is supported by the information gathered through fMRI and the fMRS. The images show that good readers use the front and back part of the brain for phonological processing tasks, and dyslexic readers use only the front of their brain (Shaywitz et al, 2003). This information is important in devising instruction for the dyslexic reader.

## Methods to Improve Reading Skills

### **Phonologic Instruction for the Dyslexic Student**

Because it is important to meet all students' needs when teaching reading, research and studies should be looked at for information and direction. Much research has focused on using phonological tasks to help children learn to read (Siegal & Vandweldin, 2006). Dyslexic students are put through a series of exercises over a twelve-week period designed to help them build their use of letter-phoneme relationships during the early reading and spelling process. The researchers decided to use modules. Children were given a word to listen to and then told to select the word from a visual list of three similar words. "Printed word sets were ordered to access phonological awareness from partial to complete with eight trials at four levels: for example, mask/dress/boat (level 1: initial-consonant-difference); meat/mask/.mould (level 2: last consonant difference); milk/monk/ask (level 3: non-initial-final consonant difference); big/bug/bag (level 4: vowel difference only)" (Siegal & Vandweldin, 2006, p. 66). The students then proceeded through more phoneme tasks to improve their skills. The students were divided into groups based on their abilities. The students that required more extensive assistance received one on one instruction. The students received 45 – 60 minutes of phoneme instruction. After twelve weeks the students were assessed and showed dramatic improvement (Siegal & Vandweldin, 2006, p. 66). From this information it has been shown that working with dyslexic students daily for an extra fifteen minutes can make a measurable difference in their ability to learn to read.

Reading intervention is best utilized early because children are more predisposed to learning; studies indicate that adults respond to such intervention but not as easily as children (Adams, Foorman, Lundberg & Beeler, 1998, pp. 2-5). Different teaching

## Methods to Improve Reading Skills

methods and ideas need to be carried out in the classroom to enhance this reading intervention.

### **Classroom Ideas for the Dyslexic Student**

#### **Teaching Approach**

Children that are learning disabled children benefit from a multi-sensory approach to learning. “Multisensory teaching is simultaneously visual, auditory, and kinesics-tactile to enhance memory and learning. Links are constantly made between visual (*what we see*), auditory (*what we hear*), and kinesthetic-tactile (*what we feel*) pathways in learning to read and spell” (Miller, 1993, p. 13). A multi-sensory approach, as the name implies, uses all the senses to learn. Learning disabilities are different in children. Their visual and auditory processing abilities may be impaired, and it is essential to follow a multi-sensory approach to teaching. The brain may respond to tactile, kinetic, visual or auditory senses or a combination of the senses. Using a multi-sensory approach alleviates stress and anxiety for the learning disabled and dyslexic student. There are some ideas that may be useful in the classroom to teach the alphabet. One way is to have the children trace the letters on a piece of carpet or clay or students can trace the letters on their pant leg. Feeling the letters may help these students remember the alphabet. Teachers can also have the students say and sing the alphabet, always keeping in mind that they need to incorporate as many senses as possible in teaching a lesson or concept (Miller, 1993, pp. 1-29).

As an assignment is given, the teacher should go over it verbally as well as provide written instruction on the board or in a handout if the child has the ability to read. The lesson should be broken down in steps so students do not feel overwhelmed.

## Methods to Improve Reading Skills

Teachers need to be innovative when telling students about assignments. According to Shaywitz et al (2003), "students have a difficult time reading a shiny surface" (p 29). This would include whiteboards and computer screens. Teachers should keep this in mind. If they write an assignment on the board they also need to pass out a handout to the learning disabled and dyslexic student. It is probably a good idea to make a handout for all the students so as not to single out any particular student or students. Another idea is to use various colors when writing about assignments on a calendar and color code steps and due dates.

Always check with the student to see if he or she has the information or if she or he needs you to go over it again. Dyslexic children often have problems with organizational skills, and helping them only takes a few extra minutes. This will reduce the students' stress. Encourage dyslexic students to have a friend or phone buddy that they can call to go over assignments if they get confused. Teachers need to practice patience and understanding; never humiliate a student or point out that special accommodations are being made.

According to *Understanding Learning Disabilities*, children with disabilities may exhibit problems with the following; attention (*easily distracted*), auditory, visual, language, math, memory (*short term*), movement, organization, reading, social, thinking and writing (Turkington & Harris, 2003, pp. 6-7). Since, dyslexic and learning disabled students have problems with distractions keep this in mind when assigning seats. Avoid placing the student next to distracting students or noisy areas. It is a good idea to have the students sit near the front of the classroom. When grading keep it simple; don't "red pen" every single mistake. Give the student a bit more "wiggle" room. Keep in mind

## Methods to Improve Reading Skills

that a student that achieves is much more likely to keep trying than one that is failing.

Grade on the “curve” to encourage the students on assignments and tests. Do not give the student too much homework or he or she will become overwhelmed; keep in mind that these students are already working twice as hard as the other students.

Technology is a great resource for these students. “Computers and high technology have several applications in the education of learning disabled student “(Reid et al, 1991, p. 46). Students need to be allowed to use calculators, computers, video tapes, audio tapes and any other available technology. “Computers are excellent for problem solving simulations in that they provide learning situations in which students’ responses can be almost instantaneously evaluated and outcomes of the choices presented” (Reid et al, 1991, p. 46). Rewards are a great motivator for any student but are even more important for the learning disabled and dyslexic student. Time is another factor to consider: students should be encouraged to work at their pace. It is important not to pressure them to complete tasks, including exams, within a strict timeline. For the dyslexic reader extended time on a test can make all the difference in making a good or a poor grade. Special consideration should not be given just for the dyslexic student but to all students with a learning disability.

### **Test-taking**

Test-taking for the dyslexic student can be very stressful. However, there are several things that a teacher can do to make test-taking easier:

- Ignore spelling, grammatical and sentence structure errors
- Accept answers in point form

### Methods to Improve Reading Skills

- Use short-answer and/or multiple choice testing
- Make sure that instructions are clear and read them to the student if necessary
- Do not overload the test paper with writing, and break the test up into chunks over a number of pages so that the student isn't overwhelmed
- Subtly ask the student if he or she is okay during the test and if the student is off on a tangent, quietly direct him or her back on track
- Keep the student aware of the time and check if the student is writing
- Allow the student more time to complete the test
- Use a word processor and calculator during the test/exam
- Consider a one-on-one test situation with the child and a staff member in a quiet environment in which the student can take breaks and move around. (Blevins, 2001)

### **Alternatives to testing the dyslexic student**

Traditional testing is not always the answer, nor is it always effective, with students with dyslexia and other learning disabilities. There are other methods:

- Use oral testing. The test/exam is read to the student and the student orally gives answers or responses to each question
- The use of a scribe to assist with taking notes

### Methods to Improve Reading Skills

- The child dictates his answers or responses to a teacher who writes them down verbatim
- No formal testing at all
- Assessment of the student would be made by course work only
- Projects/ assignments to reinforce discussed methods
- Oral presentations, computer generated presentations (Power Point)
- Multi-media presentations, photography - meeting skill-based criteria. (Blevins, 2001)

### **Application of fMRS in Autism**

#### **Test group of fMRS of autistic participants**

Because better diagnosis can lead to better treatment of those with learning disabilities, including autism, it is important to look to information available when planning a corrective educational plan. One study included eighteen high functioning autistic healthy participants and a control group of eighteen healthy participants not diagnosed with autism. This test is similar to the test performed on individuals with dyslexia. The study was supported by the University of Pittsburg-Carnegie Mellon Collaborative Program of Excellence in Autism and the National Institute of Child Health and Human Development. According to this study the participants were measured using fMRI while performing the Tower of London task – a problem-solving test. The two groups of participants activated the same area of the cortical but in varying degrees. The autistic participants showed a decrease or an "under connectivity" between the frontal and parietal areas. The activation was lower than the participants that did not have autism.

## Methods to Improve Reading Skills

Second, the autistic participants' showed specific parts of the corpus callosum where the activated cortical areas communicate were smaller. Third, the genu of the corpus of the corpus callosum was correlated in size to the frontal-parietal functional connectivity (Just et al, 2006, p. 17). This study is important because it helps us to understand how the brains work differently in people that have autism.

The significant changes were observed only within the group of autistic participants but not within the control group. This study demonstrates that children with autism have significantly decreased activation deep inside their brains in areas that are responsible for reasoning and problem solving. "These findings suggest that the neural basis of altered cognition in autism entails a lower degree of integration of information across certain cortical areas resulting from reduced intra-cortical connectivity "(Just et al, 2006, p. 17). The findings show that autistic children have difficulty with setting goals, decision making and problem solving due to a disruption in their brains, which makes it difficult for these children to become active readers. Active readers are able to process information and make decisions about information they are reading quickly, children with autism cannot manipulate information fast enough or set goals while they are reading, hindering their ability to become active readers.

Educators can use this information about autism and adapt lesson plans on literacy skills. Teachers armed with such knowledge are better able to work with and teach children with autism to read as fluently as possible.

## Methods to Improve Reading Skills

### **Teaching Reading to the Student with Asperger's Disorder**

Traditional literacy classroom instruction consists of activities that include phonics, phonological awareness, vocabulary lessons, graphic organizers, word walls, shared reading, reading theater, journals, word mapping, etc. SBRR indicates that students need to build schemas, process information, expose students to lessons multiple times and activate prior knowledge (Jefferson & Sweet, 2005, pp. 21- 23). Students are given assessments to determine whether they are learning the information they are taught in class. These assessments might include tests that contain true/false questions, multiple choice questions, short answers, or essays. Students demonstrate their knowledge with graphic organizers, cloze activities-to build comprehension, note taking, reading aloud, and journaling, and by having grand conversations. Teachers use these assessment tools to do lesson plans and to track a student's progress.

Students with Asperger's have a difficult time with these traditional methods due to limited social skills. They may feel stress when they are asked to interact with classmates and due to this stress may become agitated. Children with Asperger's have problems with building relationships with peers and sharing emotions. These children often use ritualistic behaviors to center or ground themselves (Shaywitz et al, 2003). In short, their behaviors, at times, are not conducive to the traditional classroom. Teachers must be willing to make accommodations to the Asperger's student. They need to be flexible with their teaching methods. Appendix A lists ideas to accommodate teaching in the classroom.

Since children with Asperger's show an expert knowledge in areas in which they are interested, they often do not have cognitive delays. It is important for teachers and

## Methods to Improve Reading Skills

reading specialists to keep this in mind and to use these strengths to develop good reading strategies for students. Getting the student interested in learning is crucial. Teachers should ask themselves if a reading selection will catch the students' attention. Reading material that shows real life examples that will interest the students should be chosen. For example, an article on setting up an X-Box would be more interesting to most students than an article on the economic times. Students should be able to choose their own article or book to read on a topic in which they are interested (Shaywitz et al, 2003).

The expectations, learning outcomes and instruction must be clear and well-defined. Outcomes can include using graphic organizers to write down main ideas, vocabulary, anything that you are working on with the student. The graphic organizer can be used as a tool for the student to stay on track. Able readers use graphic organizers to reinforce lessons. Students can use journaling to write down reflections about what they are learning. A journal is also a good assessment tool for the teacher to see if a student is on track. Journaling requires a student to stay on task and think about reading.

Teachers need to write the assignment and expectations clearly on the board or on an overhead. Providing clear expectations and instructions, and using real life examples, help the student with a meaningful learning experience.

Reading intervention needs to be supportive. Teachers need to take time with the students. There should also be assessment-driven instruction. Assessments should include screening, diagnostic, and progressive monitoring and should be based on outcomes. Teachers should use the information from the assessments to identify students that need reading intervention and determine resources that will help the learning disabled and poor readers improve their reading skills.

## Methods to Improve Reading Skills

Peer-reviewed journals often offer research and information that can be used in the classroom setting that embraces reading intervention. This valuable research, along with other tools like fMRI and fMRS, can assist teachers work with struggling readers.

### **Application of fMRI and fMRS for the Struggling Reader**

The application of fMRI and fMRS is important to the educator as these scans show that the brain of the learning disabled person does not biologically work the same way as the poor reader's. It also shows that the poor reader has a deactivation in the brain, as opposed to the able reader. Teaching reading to the poor reader is really the same as teaching reading to any student that is not learning disabled.

There are many reasons why a child might be a poor reader. The primary reason generally is that they have not been exposed to reading before starting school. Often children that are poor readers come from homes that have parents who are poor readers. These students often have not been read to as small children (Tompkins, 2007, p.211). Children need to be exposed to sounds and words to understand that there is a connection to the symbols; that these symbols make up words; and the words make up a story. Additionally, children need to learn to decode words and sounds. If a child is not read to before entering school, he or she will not have the opportunity to listen to sounds and words, hence, hampering his or her ability to decode words and making the connection that sounds make up words.

In another test two groups were formed; a group of able reading children and a group of poor readers. An fMRI was performed before and then after reading intervention. Before reading intervention the poor readers had an area of the brain that

## Methods to Improve Reading Skills

was inactive compared to the good readers who had more white matter in the same region. After reading intervention the poor reader's brain was activated, shown by an increase in white matter. Studies prove that reading intervention is effective in these students. That the end result is there is little difference between the brain of an able (good) reader and the brain of a poor reader after reading intervention (Keller & Adam, 2009, pp. 624 - 631).

To find ways to teach struggling readers, it is important to understand how good readers learn to read and try to apply those methods and techniques to struggling readers. It is also important to understand the difference between good readers and poor readers.

### **Poor Readers Compared to Good Readers**

Reading strategically is important to becoming a fluent reader. Poor readers, in contrast to good readers, do not read strategically. They are not actively reading. "The act of monitoring one's unfolding comprehension of text is called metacognition, or sometimes metacomprehension" (Reutzel & Cooter, 2007, p. 205). Poor readers lack the ability to develop megacognitive awareness, and to select and apply reading strategies that aid in comprehension. "The ability to plan, check, monitor, revise, and evaluate one's unfolding comprehension is a particular importance in reading" (Reutzel & Cooter, 2007, p. 205). Poor readers have difficulty with breaking down information and asking questions of themselves while reading.

Poor reader's exhibit difficulty with decoding skills, thus they have trouble with reading the words accurately (Tompkins, 2007, p. 212). Poor readers typically read slowly and they comprehend very little of what they are reading because they are spending time trying to figure out what the words are rather than the meaning of the

## Methods to Improve Reading Skills

words. “Children who are not fluent readers often read hesitantly, in a word by word fashion with great effort” (Tompkins, 2007, p. 159). Children that learn words as a whole unit spend less time trying to figure out the meaning of the word and read much faster (Blevins, 2001, p.7).

Often these readers do not have prior knowledge about a subject or text they are reading. “Capable readers relate what they are reading to background knowledge, whereas less capable readers do not make the connection” (Tompkins, 2007, p. 212). Even if a poor reader has prior knowledge he or she is often not able to draw on such knowledge while reading; compared to capable readers who are able to make inferences as they are reading. Capable readers are able to activate their prior or background knowledge to decipher clues in the text. They are able to make conclusions about words, events and characters. They understand that an author may imply information rather than be specific. Often good readers use imagery. They can create mental images about the stories and characters they are reading about (Tompkins, 2007, p. 211).

Vocabulary may be difficult for poor readers to acquire. Additionally, “capable readers have larger vocabularies than less capable readers” (Tompkins, 2007, p.212). Teachers should be aware that small vocabularies may be a sign of a learning disability.

Many poor readers do not understand text organization. This lack of knowledge about organizational structure of expository text makes it difficult for them to read and comprehend the text. After reading, poor readers rarely reflect on their reading or seek out additional information on what they have just read (Reutzel & Cooter, 2007, p. 205). “Poor readers generally lack critical thinking skills; they are not able to decipher context clues, authors' tone and purpose, inference or conclusions” (Blevins, 2001, p.7).

## Methods to Improve Reading Skills

Since poor readers have such great difficulty they often lack confidence in their ability to read. They may not read often or widely, resulting in less exposure than good readers and less practice, which only compounds their problems. Exposure to a rich text environment is important for children to develop good reading skills.

Good readers are active readers; they monitor their reading and they ask questions about the material as they are reading (Reutzel & Cooter, 2007, p. 205 - 208). For example, they may ask what is the author trying to say? What is the author's message? What is the meaning? They may rephrase a passage in their own words and reflect upon the meaning. Good readers will look up the meaning of the words that they are not able to figure out from the context of the sentence or paragraph. They engage metacognitive skills as they read as opposed to poor readers. With practice, time and positive instruction, good readers can become fluent readers (Tompkins, 2007, pp. 210 -218).

### **What do fluent readers do?**

Fluent reading is seemingly effortless but in reality it is made up of highly complex reading skills. Fluent readers are able to coordinate reading skills. They are processing what they are reading, and after reading they continue to process information. Fluent readers set goals before reading; they make mental note of the organization of the text, making decisions about what is relevant, and they ask questions in their mind about what they are reading. Before reading they look over the text, or pre-read, and they look at the cover of the book or magazine, the index, heading and subheadings (Tompkins, 2007, pp. 260 – 274).

Fluent reading consists of reading words accurately and understanding the meaning of the written word, and if fluent readers do not understand the text they are able

## Methods to Improve Reading Skills

to fill in the gaps from the context of the sentences. Fluent readers are able to connect the words to the sentences they are reading. They are able to activate their prior knowledge to make predictions. Paris, Wasik & Turner (1991) stated that “good readers continuously evaluate their predictions and revise as needed” (p. 609). Fluent readers consistently make predictions, and construct and revise conclusions.

The goal for reading practitioners is to help all students to become fluent readers, to help students feel satisfaction when they are reading, and to build their confidence and help them to feel successful with their reading skills. “Children are more likely to engage in reading and writing when their classroom is a learning community that respects and nurtures all children” (Tompkins, 2007, p. 209). Children respond to a positive learning environment in which they are encouraged to develop useful skills such as phonemic awareness.

### **Phonemic Awareness**

Phonemic awareness is often confused with phonics. Phonemic awareness is the ability to identify, hear and manipulate specific sounds. These sounds are called phonemes (Tompkins, 2007, pp. 95 -105). Children need to understand and be able to manipulate the sounds that make up words that they hear. Prior to learning to read children need to know how sounds work. Children must have a concept that sounds make up words. Phonemes are the smallest part of speech and are written as graphemes or letters of the alphabet (Center on Teaching and Learning, 2009). Following is a list of phonemic awareness skills that students should be able to do on the first grade level:

## Methods to Improve Reading Skills

1. Identify the sounds in words. The ability to hear and manipulate the sounds in spoken words and the understanding that spoken words and syllables are made up of sequences of speech sounds.
2. Categorize sounds in words, essential to learning to read in an alphabetic writing system, because letters represent sounds or phonemes. Without phonemic awareness, phonics makes little sense.
3. Blend sounds to form words. If a child cannot hear that "man" and "moon" begin with the same sound or cannot blend the sounds /rrrrrruuuuunnnn/ into the word "run", he or she may have great difficulty connecting sounds with their written symbols or blending sounds to make a word.
4. Substitute sounds to make new words, fundamental to mapping speech to print. Essential to learning to read in an alphabetic writing system.
5. Segment a word into sounds, children learn to break a word into a beginning, middle, and end sounds. Example – children segment the word feet /f/e/t and go /g/o/

(Center of Teaching and Learning, n.d.)

Phonemic awareness is important because it improves students' reading comprehension and helps students learn to spell and use vocabulary correctly. Phonemic awareness along with phonics helps students decode words. It is important that students understand blending and segmenting sounds (Center of Teaching and Learning, n.d.).

## Methods to Improve Reading Skills

Once students understand blending and segmenting they need to learn the alphabetic principle.

### **The Alphabetic Principle**

Reading a story aloud is the perfect time to incorporate the alphabetic principle. “Children's reading development is dependent on their understanding of the alphabetic principle – the idea that letters and letter patterns represent the sounds of spoken language. Learning that there are predictable relationships between sounds and letters allowing children to apply these relationships to both familiar and unfamiliar words, and to begin to read with fluency” (Texas Education Department, 2008).

The alphabetic principle uses the alphabet to represent speech sounds or phonemes. There are two stages involved when reading, using phonemic awareness such as rhyming, and discussing how words sound alike. An example is using cat and hat or duck and luck. The teacher will identify parts of the word then change the first syllable or letter to create a new word and then see if the students can decode the word. Teachers can develop print awareness by having students point to words and letters they know. Having students use their fingers to trace letters and discuss the sound of the letters is also a good technique because it uses tactile learning. This beginning stage is the pre-alphabetic stage. Students should interact with the story. Students will develop word recognition as they repeat words and identify letters and words; they will expand their vocabulary as they learn to sound out words and blend sounds together. The more that reading is integrated into the classroom, the more practice students will get. When teaching students to blend letters together and decode words, teachers are using the early alphabetic reading stage (Texas Education Department, 2008).

## Methods to Improve Reading Skills

As students develop reading and comprehension skills they will continue to advance with the alphabetic principle. They will soon recognize chunks of orthography and learn from the redundant use of sounds and words and word endings. Students will be able to decipher words that are not familiar to them. For example, common endings such as *ing*, *ed*, *est* would be taught and explained. Teachers can give examples to show students how these endings are used. This stage, where students are shown and are learning more advanced alphabetic principles, is known as the mature alphabetic stage (Texas Education Department, 2008).

Next, as teachers work with students they will use the orthographic stage which is learning the association of sound to symbols. Students will be able to read new words; they will move past sounding out words, letter by letter (Texas Education Department, 2008).

Lastly, readers learn from modeling, which is replicating how another person reads and paces his or her reading. They will learn how another person stops or pauses at punctuations and the tempo at which to read (Texas Education Department, 2008).

### **Why is developing phonemic awareness so easy for other students?**

“It has been reported that without direct instructional support, roughly 25% of middle-class children--and substantially more children from less economically advantaged homes - fail to develop [phonemic awareness] ” (Reading First in Virginia, para.10, 2010). Children who do not understand that sounds make up words will have little to no phonemic awareness. Children that are not exposed to reading in the home before starting school have not developed phonemic awareness skills. Children must be

## Methods to Improve Reading Skills

exposed to reading or hearing words and sounds at home before learning to read (Reading First in Virginia, 2010).

Some children have learning disabilities that interfere with manipulating sounds and decoding skills. Students that are not native English speakers may have difficulty with phonemic awareness because they are often not literate in their own language or come from economically disadvantaged homes (Reading First in Virginia, 2010).

Early exposure to reading in the home is one of the greatest predictors of successful emergent readers. Parents, siblings, and pre-school teachers have often promoted reading and talking with children as time spent with the child helping him or her to understand sounds and how sounds relate to and become words. Often phonemic awareness and phonological awareness are thought to be the same thing, they are not. “Phonemic awareness is a subcategory of phonological awareness, which refers to the more general understanding of the sound structure of language” (Reading First in Virginia, 2010, para.1).

### **Phonological Awareness**

“Phonological awareness encompasses more general aspects of sound, such as rhyming and alliteration. It also includes identifying and manipulating larger parts of spoken language: words, syllables, onsets, and rhymes” (Reading First in Virginia, 2010, para. 1). Phonological awareness can be developed through carefully planned instruction, and this education has a significant influence on children's reading and spelling achievement.

## Methods to Improve Reading Skills

### **What types of classroom activities can make it easier for students to acquire phonological awareness?**

Activities in the classroom can include modeled reading, independent reading, and writing activities. Interactive activities are important such as choral reading. Literacy centers and literacy play centers also are beneficial. For more suggestions refer to appendix B.

Teachers should try to make reading fun by displaying interesting books, those that have vivid covers, and group them together by topics so students can walk around and explore. The Reading First in Virginia web site has several lists of books that can be used in the classroom. A text-rich environment promotes children reading independently because text-rich environments can be individualized to meet a student's needs; teachers are able to create both independent and directed activities to increase understanding of concept of print and word, linguistic and phonemic awareness, and vocabulary development. All of this occurs in a physical setting giving students with disabilities numerous opportunities to gain the skills necessary to take part in the general education curriculum.

### **What types of things can families do at home to foster phonological awareness?**

Families can read together, or play games – such as substituting the beginning of words to make new words and sound to increase phonological awareness. During shared reading times use big print books with pictures, discuss the stories, and make predictions. Children can act out the stories to make it more interesting to them, or sing songs and use poems. It is a good idea to have children post words on a word wall to teach the high frequency words since it shows children all the words they know, which will bolster their

## Methods to Improve Reading Skills

confidence. Parents need to interact with and make time for their children to develop phonological awareness skills (Reading First in Virginia, 2010).

### Summary and Conclusion

In conclusion, reading is essential as people move through school as well as through life in general. Parents and educators can give the love of reading to all children by taking time to work with children and help them to learn to read fluently. Children with learning disabilities may never be able to read as well or as quickly as a good reader. However, as educators, we should be tolerant and understand that they are achieving as well as they can. We need to let go of preconceived notions and expectations. It should be the goal of educators to take the research available and come up with a plan to help the student prepare for reading by giving extra help with phonological tasks. The main point is that the student needs more time and more instruction with phonological tasks. Utilizing information found in the fMRI or fMRS is crucial for educators to devise a plan to help each student become a successful reader regardless of what type of reader he or she is.

The imaging techniques that are discussed in this paper, fMRI and fMRS, explain that learning disabilities can be due to brain-based disorders. Often, parents and educators do not realize that these disorders are brain-based because children respond so well when they are given extra time and instruction; these studies show that the extra instruction makes all the difference for these children. This paper shows how the information obtained by fMRS and fMRI can be used to help teachers teach students who are learning disabled, or who are poor readers, to read. As these methods become more

### Methods to Improve Reading Skills

common, reading instruction can become more tailored to individual students. All students, regardless of ability or disability, can learn to become more fluent readers if given some time, solid instruction and patience.

## References

- Adams, M. J., Foorman, B. R., Lundberg, I., & Beeler, T. (1998). *Phonemic awareness in young children*. Hartland, VT: Brooks Publishing.
- Algoe, S. (2010). fMRI. In functional MRI. Retrieved February 1, 2010, from <http://hubpages//MRI>
- Balise, R., Black, J., Nussbaum, N., Oakland, T., & Stanford, G. (1998). An evaluation of the dyslexia training program. *Journal of Learning Disabilities, 31*(2), 140-147.
- Blevins, W. (2001). *Building fluency: Lessons and strategies for reading success*. New York, NY: Scholastic Professional Books.
- Bright Solutions. (1998). What is dyslexia? Retrieved March 7, 2010, from Bright Solutions website: <http://www.dys-add.com/.html>
- Castle, A. (1997). The basis of developmental dyslexia: Neural, cognitive, genitive, genetic or all three? *International Journal of Disability, Development and Education, 44*(4), 387-390.
- Center of Teaching and Learning. (n.d.) Big ideas in beginning reading. University of Oregon. Retrieved February 21, 2010, from [http://reading.uoregon.edu/big\\_ideas//](http://reading.uoregon.edu/big_ideas//)
- Donnelly, K. (2000). *Coping with dyslexia*. New York: The Rosen Publishing Group.
- Dyslexia Association. (2000, January). Signs of dyslexia. *Dyslexia Association, article 3*.
- Jefferson, S. P., & Sweet, B. (2005). *Success education: Differentiated curriculum strategies for esl and learning disabled students*. Boca Raton, FL: Universal.

## Methods to Improve Reading Skills

Just, M. A., Cherkassy, V. L., Keller, T. A., Kana, R. K., & Minshew, N. J. (2006).

Functional and anatomical cortical underconnectivity in autism: Evidence from an fMRI study of an executive function task and corpus collasum morhometry.

Retrieved January 16, 2010, from <http://brain.oxfordjournals.org/3135>

Klin, A., & Volkmar, F. (1995). Asperger's syndrome: Guidelines for assessment and diagnosis. Yale School of Medicine. Retrieved from <http://info.med.yale///.html>

Keller, T. A., Adam, M. (2009). Altering cortical connectivity: Remediation-induced changes in the white matter of poor readers. *Neuron*, (64), 624-631.

Lawton, S. C. (2007). *Asperger syndrome: Natural steps towards a better life*. Westport, CT: Praeger.

Miller, W. H. (1993). *Complete reading disabilities handbook: Ready to use techniques for teaching reading disabled students*. West Nyack, NY: The Center for Applied Research in Education.

Narayana, S., & Xiong, J. (2003). Reading treatment helps children with dyslexia and changes activity in language areas of the brain. *Neurology*, (61), 5-8.

National Institute of Neurological Disorders and Stroke. (2009). *Autism fact sheet*. New York: National Institute of Neurological Disorders and Stroke.

Paris, S. G. Wasik, B.A. & Turner, J.C. (1991), The development of strategic readers. *Handbook of reading research* (2<sup>nd</sup> ed.). New York, NY: Longman.

*Reading First in Virginia*. (2010). Retrieved February 26, 2010, from [http://www.readingfirst.virginia.edu/\\_dev/\\_awareness/.html](http://www.readingfirst.virginia.edu/_dev/_awareness/.html)

Reid, D. K., Hresko, W. P., & Swanson, H. L. (1991). *A cognitive approach to learning disabilities* (2nd ed.). Austin, TX: Pro-Ed.

## Methods to Improve Reading Skills

Reutzel, D. R., & Cooter, R. B., Jr. (1992). *Teaching children to read: From basal to books*. Don Mills, Ontario: Macmillian Publishing Company.

Richards, T., Ayward, E., Berninger, V., Fields, K., Parsons, A., Richards, A., & Nagy, W. (2006). Individual fmri activation in orthographic mapping and morpheme mapping after orthographic or morphological spelling treatment in child dyslexics. *Journal of Neurolinguistics*, 2006b(30), 56-86.

Sanders, J. A., & Orrison, W. W. (1995). Functional magnetic resonance imaging. *Functional Magnetic Resonance Imaging*, 1995b(4), 239-326.

Shaywitz, S. (1998). Current concepts: Dyslexia. *The New England Journal of Medicine*, 1998(338), 307 -312.

Shaywitz, S. E., Moody, M., Bennett & Shaywitz, B. A. (1997). Neural mechanisms in dyslexia. *Scientific Discoveries*, (47), 111-145

Shaywitz, S.E., Shaywitz, B.A., Mencl, E., Constable, R.T., Pugh, K., Holahan, J. Marchione, K., Fulbright, R., Skudlarski, P., Fletcher, J.M., Lyon, G.R., & Gore, J.C. (2003). Neural systems for compensation and persistence: Young adult outcome of childhood reading disability. *Biological Psychiatry*, 2003(54), 25-33.

Siegal, & Vanweldin. (2006). Intervention-based psychological new approaches. *The British Psychological Society*, 2006(23), 3 -5

Texas Education Department. (2008). Retrieved March 13, 2010, from <http://www.readingrockets/database/3408/>

Tompkins, G. E. (2007). *Literacy for the 21st century: Teaching reading and writing in prekindergarten through grade 4* (2nd ed.). Columbus, OH: Pearson Merrill Prentice Hall. (Original work published 2003)

Methods to Improve Reading Skills

Turkington, C., & Harris, J. R. (2003). *Understanding learning disabilities: The sourcebook for causes, disorders, and treatments*. New York, NY: Checkmark Books.

Wiseman, N. D. (2006). *Could it be autism? A parent's guide to the first signs and next steps*. New York: Broadway Books.

## Appendix A

**Instruction Ideas**

Ideas to accommodate lessons

| Characteristic of AS   | Instead of   | Try  |
|--|--|--|
| <ul style="list-style-type: none"> <li>Deficits in social interaction</li> </ul>   | Think, pair, share   | Think, write, pair, share or script this activity. Use readers' theatre  |
| <ul style="list-style-type: none"> <li>Difficulty reading nonverbal social behaviors</li> </ul>  | Collaborative groups   | Teach facial expressions related to emotions and unstated thoughts using a text with a character profile of interest to the individual with AS   |
| <ul style="list-style-type: none"> <li>Difficulty initiating, participating in and sustaining peer relationships</li> </ul>              | Collaborative groups and book clubs  | Define, teach and assign roles of group members prior to stating the demands of group work   |
| <ul style="list-style-type: none"> <li>Lack of sharing their own interests and reciprocating with sharing interests of others</li> </ul> | Exploration of genres<br>Popcorn Reading<br>or volunteer participation in class discussion | Offer students a list of timeframes and genres for the semester or year (they may need to prepare for these changes in content)<br>Offer a speaker pass to define reciprocal classroom participation - some students with AS may need forewarning to develop their response prior to being |

## Methods to Improve Reading Skills

- called upon (scripted participation)

Teach, write together and read/use social narratives.
- Social/emotional reciprocity (perspective and point of view of others)

Character development (including point of view)

Role play and scrip characters related to the student's story-based profile; help link the character to elements of people they know (may need to be visually represented in a graphic organizer)
- Engages in restrictive and repetitive behaviors

Classroom managed by expectation of uniformity and conformity

Plan for students to differ according to their regulatory needs

Give timeframes for tasks.
- Develops routines and rituals

Fast-paced transitions from one reading-related task to another

Gauge work with time and ability Use visual timers, songs, or countdowns to cue transitions.

Designate a place for unfinished work and mark it with a note as to when it should be completed
- Preoccupied with

Plot mapping

Teach and encourage the use of graphic

## Methods to Improve Reading Skills

|  |   |
|--|---|
| the parts, rather than Webbing<br>the whole  | organizers that link the parts and the whole (letters to words; introduction, rising action, climax and closing to plot; age, gender, personality, mood, etc. , to character) |
|  | Encourage placement of parts into a visual structure that represents a whole, with the expectation that the whole will be named.  |
|  | Break assignments into steps and provide in writing   |
| <ul style="list-style-type: none"> <li>• Demonstrates difficulty with executive functioning</li> </ul> | <p>Title based assignments (e. g., "for homework tonight, do your journal". . . ")</p>  |
|  | Present directions in writing   |
|  | Oral directions Teach the use of graphic organizers, guided notes, outlining and highlighting   |
|  | Note taking text  |

(National Institute of Neurological Disorders and Stroke, 2009)

## Appendix B

**Classroom Activities**

- Use environmental print – print that is all around us on signs and in advertisements
- Include literacy materials in play centers
- Read aloud to children
- Read poems on charts and big books using shared reading
- Introduce the title and author of books before reading
- Teach directionality and letter and word concepts using big books
- Encourage children to make predictions
- Encourage children to make text-to- self connections
- Have children retell and dramatize stories
- Have children respond to literature through talk and drawing
- Have children manipulate sounds using phonemic awareness activities
- Use alphabet teaching routines
- Teach children’s dictation using the Language Experience Approach
- Teach 20 – 24 high frequency words
- Post words on a word wall
- The focus should be on developing phonemic awareness skills:
  - Recognizing which words in a set begin with the same sound. Example – bell, bike and boy all have the /b/ at the beginning

## Methods to Improve Reading Skills

- Isolating and saying the first or last sound in a word. Example -the beginning sound of dog is /d/, the ending sound of sit is /t/
- Combining, or blending the separate sounds in a word to say the word. Example --map --/m/ /a/ /p/--map
- Breaking, or segmenting a word into its separate sounds. Example --up--/u/, /p/
- Phoneme isolation
- Phoneme identity
- Phoneme categorization
- Phoneme categorization
- Phoneme blending
- Phoneme segmentation
- Phoneme deletion
- Phoneme addition
- Phoneme substitution (Reading First in Virginia, 2010)