

Final Assignment 1

Reviewing Literatures on Learning Barriers (caused by Dyslexia) and A
Search for Effective Technology Driven Solution

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With the advances of new technologies in educational settings, many educators are hopeful of lowering the barriers students face today, especially for those who face steep barriers caused by Dyslexia. "*Dyslexia*" is a syndrome where a child with normal intelligence exhibits difficulty in learning to read and write (Center for the study of Learning, n.d.). There are other notable symptoms of dyslexia such as difficulties in following instructions, concentration, perception, verbal skills, abstract reasoning, hand-eye coordination, and social adjustment. Although most dyslexic children have an average or above average IQ, they may also have a poor visual memory for language symbols as well as poor working memories. They may also have problems with word reversals, and difficulties in finding the right word, fluency, meaning, or sequence. All these symptoms point to an abnormality in the language centers of the brain (Science Daily, 2007).

Fortunately, most research articles involving dyslexia conclude with predictions that newly developed technologies will play a greater role in improving dyslexic students' academic achievement. Scientists believe that this problem is neurobiological and brain dysfunction in nature. There is expectation that a treatment program using newer technology would be tremendously beneficial if early intervention takes place for dyslexic children. This gives hope to those who are dyslexic and suffer from impaired educational environments which are not currently equipped to handle dyslexic students.

The aim of this paper is to examine the issue by conducting a literature review of related research articles and propose a new research proposal (see Research Proposal "MChowdhuryFA2") based on the reviews and conclusions herein. In the literature surrounding the issue of dyslexia, there are four prominent articles that focus on learning difficulties and argue in favor of technology driven solutions.

Article #1

Technology Applications for Students with Literacy Problems:

A Critical Review

This article is a major review of the research literature on assistive technology by MacArthur, Ferretti, Okolo, and Cavalier (2001) which covers research conducted in 1990s on the use of technology to support literacy among students with mild Learning Disabilities (LD). The findings from this research encourages the use of computer-assisted instruction and synthesized speech feedback to improve students' phonemic awareness and decoding skills, as well as the benefits of electronic texts to enhance comprehension to encounter reading meaningfully. Overall, this research article lays stress on the need for extra assistance to serve struggling students. These assistances could come in the form of computer software that is comprehensive, self administrated and custom selected or custom designed.

The article by MacArthur et al. (2001) contains reviews on the previous literature from the fifteen years of research on Computer Assisted Instructions (CAI) for students with mild LD. All the studies selected in this review support the use of CAI. The authors have defined assisted technologies into three different categories: word-Identification, text comprehension and writing skills. The categorization of these particular learning challenges is useful in order to select assistance (such as word processing, word prediction, voice output, spell checker, thesaurus, and grammar checker) for students with wide range of disabilities. The authors summarize their findings in an extensive observational mode, and stress the need for further research efforts in technology-based assistances.

This paper successfully evaluates assistive technologies for LD students available roughly between 1985 and 2001 based on mainly experimental research methodologies (Gay, Mills, Airasian, 2009). However, CAI applications found in the article seem to be outdated by the fast pace of changing technologies available today; therefore, makes some of the content in this article no longer relevant to deal with the current necessity for solutions to the problem as far as the speed, simplicity and sophistication of technologies goes between now and then.

Article #2

Assistive Technology and Mild Disabilities

A recent article by Edyburn (2006) focuses on the use of technology to enhance academic performance. Dave L. Edyburn, Ph.D., is a Professor in the Department of Exceptional Education at the University of Wisconsin-Milwaukee. His teaching and research interests focus on the use of technology to enhance teaching, learning, and performance (National Institute for Literacy, 2006). The purpose of his article is to provide a brief introduction to the effective use of available assistive technologies for students with mild disabilities. Edyburn (2006) writes that some progress has been made in the past ten years but students with LD do not have the appropriate access to those assistive technologies. Therefore, there is an urgent need for leadership roles to address the issue by setting up policies and practices tolerant to assistive technologies and initiate efforts to reach those who are underserved.

Edyburn (2006) proposes three phases of the assistive technology process: consideration, intervention, and outcome, and a call for empowering individuals and

organizations to identify new interventions that will enhance the academic and behavioral performance of students with LD. According to the author a spell checker for a LD student taking a class test is just as important as for a student with physical disability use a wheel-chair to get to his/her test desk. Nonetheless, the main concern is when and how do educators decide to intervene and compensate a student to encounter his disability, with what type of assistance, and to what degree. Responding to these questions, Edyburn (2006) presents a formula that allows collecting and evaluating data to determine the efficacy of the interventions in order to understand the effort and cost necessary to obtain the desired benefits.

It is evident in this article that author's focus is exclusively on reading, writing and math but little attention is given in other areas such as science, social studies, social skills, etc. More importantly, the solutions Edyburn (2006) proposes do not call for more advanced research that could be applied early as a preventive means to tackle the challenges before children start learning to read and write. In theory Edyburn seems to believe LD is not curable, it is a permanent disability and one with such disability has to rely on assistive tools.

Article #3

The Role of Neuroscience in the Remediation of Students with Dyslexia

The article by Eden and Moats (2002) is an important paper in order to understand the neurobiological aspect of brain imaging function involving dyslexia. Guinevere F. Eden, Ph.D., is the president of the Center for the Study of Learning (CSL). Eden employs brain imaging technology to visualize how reading

pathways of the brain are impacted by instruction (e.g. intervention approaches applied to students with dyslexia). Louisa Moats, Ed.D. is the Vice President of CSL and a researcher (The International Dyslexia Association, n.d.).

In this article, authors characterize dyslexia as an unexplained difficulty in reading associated with behavioural deficits in phonological processing. They claim that functional neuroimaging studies have shown a deficit in the neural mechanisms causing unexpected reading problem that occurs despite normal intelligence (Eden & Moats, 2002).

Neurobiological researches involving dyslexia is widespread and the treatment approaches are predominately based on behavioral deficits which led to different accounts of the etiology of dyslexia. Although educational theory operates at a level of description different than that used by neuroscientists, the integration of information that has been accumulated from long-term clinical and educational observation more likely will lead to successful efforts for remediation (Eden & Moats, 2002).

This study is highly informative in clinical psychology manner. However, the authors admits that although an intensive phonologically based reading instruction has been developed, the neurobiological mechanisms by which it works is still unknown. Nevertheless, new researches in functional brain imaging have a brighter conclusion, and as a result the paper promotes further extensive research that would lead to highly effective and commercially reproducible treatment programs.

Article #4

Treatment for Reading and Spelling Problems of Individuals with Dyslexia: Evaluation of Clinical Effects and New Directions

This is a research project presented at the 2009 Berlin European Conferences on Reading. The authors, Jurgen Tijms of IWAL-Institute for Dyslexia (Amsterdam) and Sebastián Aravena of European Prospective Osteoporosis Study (EPOS, Department of Psychology, University of Amsterdam) provide the results of their research project into the efficacy of a Dutch psycholinguistic treatment of dyslexia. Their research involves dyslexic children and adult with a computer based learning system known as "LEXY". The objective of the research is to evaluate the effect of LEXY which is developed to treat reading and spelling difficulties. The core of the system is an integrated learning mechanism with basic linguistic elements and operations, in which the central learning device is a programmable kernel. Basically, the system encodes the characteristics of the spoken language syntax in order to simplify the basic linguistic elements and operations by which one's writing system encodes the characteristics of the spoken language system (Tijms & Aravena, 2007).

The authors in there first study selected 100 children and adults with dyslexia on the basis of a phonologically-based reading and spelling deficit (Tijms, Hoeks, Paulussen-Hoogeboom, & Smolenaars, 2003). Following the treatment, the dyslexics obtained a normal level of text reading and spelling. Their second study aimed to study the attained levels of word reading rate, text reading accuracy, text reading rate and spelling were evaluated, using two large samples of respectively 131 and 136 dyslexic children (10-14 years; Tijms & Hoeks, 2005). Both studies show positive

outcomes in all areas. There were substantial developments in their reading strength, which continued to develop even after the termination of the treatment.

However, the authors concede that there is a need for new directions of research which should focus on accelerating the growth of reading accuracy by boosting the development of instrumental phoneme-grapheme associations within a computer game environment. It is understood by most educators that creating motivation to learn, especially for children with dyslexia is a key factor, thus LEXI system (as is today) unlikely to be effective in long run.

Synthesis

All four articles focus on the challenges children with learning disabilities face today, stress the need for special programs or integration of available technologies and further research and development on the issue. Although, authors of the articles chosen in this paper have distinct backgrounds with different points of view of the problem, the cause of their quest is common. Given their different backgrounds, they have applied different approaches and methodologies in their research to address the issue. However, collectively all four articles seek for an effective technology driven assistive program to fight dyslexia.

The MacArthur et al. (2001) article emphasizes computer assisted instruction approaches for LD students that provide special access to the general education curriculum. Edyburn (2006) describes the use of technology as a cognitive-wise artificial part that can be used to upgrade academic performance of students with LD. Eden and Moats (2002) suggests the integration of information that has been

accumulated from long-term clinical and educational observation coupled with tech-based research which would lead to highly effective commercially applicable treatment programs. Tijms and Aravena (2007) advocate development of integrated learning system with linguistic associations within a computer game environment as treatment of dyslexia.

Conclusion and Final Thoughts

The literatures discussed in this review shows that the findings on learning disabilities due to dyslexia have changed over time. There is hope that soon we will have innovative technologies that will lead to successful interventions in overcome learning challenges. Researches has shown improvement in learning capabilities for those using special programs or receive help from assisted technologies in students' learning ability. However, dyslexia is not limited only to learning challenges. There are other problems associated with dyslexia which could prevent one from normal socializing, playing or carrying out tasks that are highly group oriented. We already know that dyslexic children have normal or above average intelligence. Therefore, general public perception of dyslexia needs to be redefined. Teachers, parents, even students need to be tolerant to the fact that dyslexic children learn differently.

Having suffered from inattentive type of ADHD (Attention-Deficit/Hyperactivity Disorder), I feel obligated to carry out further research on the nature of difficulties dyslexic children face today that is not limited to learning challenges and how may the ICT (Information and Communication Technology) help them integrate smoothly into the society.

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