Effects of Dysgraphia on Teachers' Perceptions of A Student's Capabilities, Intelligence, and School Performance

Cathy R. Bussey
St. John Fisher College

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Document Type
Thesis

Degree Name
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Effects of Dysgraphia on Teachers' Perceptions of A Student’s Capabilities, Intelligence, and School Performance.

Cathy R. Bussey

Graduate Department of Math, Science and Technology

St. John Fisher College
Approvals
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I would like to thank my husband Howard for reading and commenting on the manuscript and his patience with dust bunnies.

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I would like to thank the participants for being part of this study.
Table of Contents

Approvals .................................................................................................................. 2
Acknowledgements .................................................................................................... 3
Table of Contents ....................................................................................................... 4
List of Tables and Figures .......................................................................................... 6
List of Appendices ..................................................................................................... 7
Abstract ...................................................................................................................... 9
Chapter I. Introduction ............................................................................................... 11
Chapter II. Review of Literature .............................................................................. 15
  Background on Dyslexia and Dysgraphia .............................................................. 15
  Identification and Diagnosis of Dysgraphia ........................................................... 21
  Roles of Teachers, Parents and Child ................................................................. 23
  Use of Low and High Tech Tools ....................................................................... 25
  Legal aspects ......................................................................................................... 27
Chapter III. Methodology ......................................................................................... 29
  Introduction .......................................................................................................... 30
  Participants ............................................................................................................. 30
    Brief History of Evan .......................................................................................... 30
    Teachers ............................................................................................................... 32
    O.M. coaches ....................................................................................................... 33
    Eye doctor ............................................................................................................ 34
    CST personnel ..................................................................................................... 34
    Principal ............................................................................................................... 36
    Kumon .................................................................................................................. 36
  Data Collection ...................................................................................................... 37
    Research Design .................................................................................................. 37
    Data Sources ........................................................................................................ 37
  Instruments and Materials ....................................................................................... 39
  Procedures ............................................................................................................ 40
    Timeline Data Collection ................................................................................... 40
    Unit and Lesson Plans ......................................................................................... 42
    Ancillary worksheets, quizzes etc. ....................................................................... 43
    Other data Sources .............................................................................................. 43
Chapter IV. Results and Analysis ............................................................................ 45
  Cursive writing package ......................................................................................... 45
  Goals of Evan’s Teachers ....................................................................................... 45
  Data Collection ...................................................................................................... 46
    Types of dysgraphia errors .................................................................................. 46
Chapter V. Discussion ................................................................................................. 51
References .................................................................................................................. 53
Appendices .................................................................................................................. 57
  My Thesis Journal ................................................................................................. 57
  Odyssey of the Mind Lesson Plans ......................................................................... 73
  What is Dysgraphia? ............................................................................................... 80
  Meeting Transcription 10/15/02 .......................................................................... 81
Notes from Parent, Student, Teacher conference on 11-08-02 ....................................... 97
Meeting with WP Interviewing techniques ................................................................. 100
Star simulation drawing activity instructions ......................................................... 102
Star Simulation Activity ......................................................................................... 103
Sample Figures for Diagnosing Dysgraphia ............................................................. 104
Sampling of Evan’s Work ....................................................................................... 105
List of Tables and Figures

Table 1 - Misconceptions concerning dyslexia .......................................................... 16
Table 2. – Symptoms of Dysgraphia ........................................................................... 19
Table 3 – Details of Richards (1999) Six Categories of Signs of Dysgraphia .......... 20
Table 4 – Interventions at Breakdown Points ............................................................. 26
List of Appendices
Abstract

The focus of this study will explore how the dysgraphic disability of one child affects teachers’ perceptions of that child’s capabilities, intelligence, and performance of daily tasks associated with school and schoolwork. The child will use the Tablet PC’s handwriting recognition technology to determine if the assistive technology tool improves the child’s school performance and his ability to produce legible notes and papers. Worksheets were downloaded into the Tablet PC prior to use in school so that the child could complete all classroom work on the Tablet PC. [This student benefited from being able to turn handwritten notes into text. This students’ handwriting improved as a result of computer-aided practice. The use of the Tablet PC by a child with dysgraphia enables the child to be independent of the need of teacher-produced notes or a scribe.]

Bracket material needs to be supported by data yet to be collected.
Chapter I. Introduction

Currently, I am substitute teaching and co-coaching my son’s Odyssey of the Mind team. I am taking this year off from full time teaching to finish my master’s degree and thesis. I have taught math and applied physics as a secondary teacher to academically at risk eleventh and twelfth graders, algebra and pre-algebra to seventh, eighth, and ninth graders, math resource to fifth graders, and reading to five seventh grade boys pulled from the regular classroom. In addition, I taught first grade religious education, Montessori pre-school, 4-H, and coached traveling soccer. I was the elected member of a New Jersey school board for six years. I have been involved with the education of children either as a volunteer or paid employee for the last twenty years.

In my experience teaching I have seen many academically at risk students with unclassified disabilities. My experiences have made me interested in dysgraphia, which is an “impairment in the process of writing” that affects student performance (Richards, 1999). The term dysgraphia, difficulty with writing, comes from the Latin “dys” meaning difficulty and the Greek “graphia” meaning writing. Richards’ (1999) more detailed definition for dysgraphia is

“an inefficiency which seldom exists in isolation or without other symptoms of learning problems. It is most commonly related to learning problems within the sphere of written language and is frequently associated with dyslexia. However, it may also be associated with motor clumsiness or poor spatial awareness. It is one of many developmental problems which affects output or performance.” (p. 73)

I am concerned with how the dysgraphic disability of a child affects teachers’ perceptions of that child’s capabilities, intelligence, and performance of daily tasks associated with school and schoolwork.
To explore this, I will be conducting a case study of Evan, my son, who exhibits signs of dysgraphia, and the individuals involved in his education. By focusing on Evan this year, my goal is to help him understand his disability and his innate gifts. In addition, I want to help Evan develop more techniques, strategies, and compensations specific to his learning disability, style and needs. Ultimately, the goal is for Evan to become an independent lifelong learner. In order to get a complete understanding of the situation, I am relying on Evan's classroom teachers and his resource teacher to actively participate and contribute their ideas and thoughts. We are working together to find the least restrictive program for Evan.

Evan shows evidence of this writing disability daily. In school, his performance on daily work is below his tested capabilities. The quantity of writing he produces is below his teachers' expectations, and is a major concern to them. The handwriting alone indicates some difficulties. Some of his letters and numbers are frequently changed to other letters and numbers when he recopies his work. For instance, zeros, sixes, and nines (0, 6, and 9) are confused. So are twos and sevens (2 and 7), as are fours and nines (4 and 9). Evan does not close his a's so they look like u's. Additionally, Evan will mix cases and sizes of his letters along with having inconsistent baselines, margins and uneven lateral spacing. He has difficulties with lateral tracking left to right. At times he has difficulty deciphering his own handwriting, making it difficult to study his notes for tests. Formal testing has shown that Evan has weaknesses in written expression, spelling, word attack and psychomotor speed.

However, Evan has a lot going for him. Testing has shown that Evan has cognitive abilities in the superior range. Evan has strengths in listening skills, math skills
and reading skills. Evan has demonstrated strengths in abstract reasoning and visual-spatial processing. Evan has an affinity for music and plays the violin. He easily remembers and plays tunes by ear – from CD’s or live music. One difficulty with teaching Evan violin is staying one step ahead so that he does not learn the tunes with his own creative bowings and fingerings. Evan also has a strong visual-spatial ability. For instance, he drew front, top, and side views of a helicopter, with little difficulty, no training, and no external stimulation. This sort of skill is often taught in middle school technology classes. Evan has mastery of all his math facts and arithmetic algorithms orally, yet has difficulty with accuracy due to his poor handwriting. He solves many word problems mentally, yet makes computational mistakes with pencil and paper due to his handwriting. Evan has a great love of books and print, and he reads daily.

In this study, data will be collected from the perspectives of the classroom teachers, resource teacher pediatric eye specialist, Evan, other professionals, Odyssey of the Mind videos and professional screening tests. Samples of Evan’s work will also be collected showing examples of the dysgraphia and examples of Evan’s strengths. The new Tablet PC with handwriting recognition technology will be used to both train Evan to improve his writing and to decrease his frustration with writing. Additional technology such as voice recognition included in office XP software on the Tablet PC along with spellcheckers will also be explored.

The big question is how can we help Evan to reduce the severity of his disability and then help him to compensate for the remaining disability. How does Evan’s disability affect teacher’s perceptions of his capabilities and ultimately his placement in classes? By looking at all aspects of Evan’s education, my goal is to better understand one type of
dysgraphia so that I can be more aware of bright students with disabilities in my future classrooms. I don’t want these disabilities to hinder their academic success, motivation, and progress in traditional school settings.

*If [the teacher] is indeed wise, he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind.*  
Khalil Gibran, *The Prophet*
**Chapter II Review of Literature**

The main focus of this literature review will be dysgraphia. However, dysgraphia cannot be discussed without also discussing dyslexia. Many early studies did not separate the two disabilities. I am reviewing this literature to obtain a better understanding of implications for students with these types of literacy disabilities in the schools. The areas of focus are:

- Background on dyslexia and dysgraphia,
- Identification and diagnosis of dysgraphia,
- Roles of teachers, parents and student,
- Use of low and high tech tools to compensate or remediate, and
- Legal aspects.

**Background on Dyslexia and Dysgraphia**

Literature discussing dyslexia goes back a hundred years. Many misconceptions surround the understanding of dyslexia. Table 1 is a list of misconceptions commonly held about dyslexia found in Richards (1999). The broad International Dyslexia Association, IDA’s definition dispels many of these misconceptions:

Dyslexia is one of several distinct learning disabilities. It is a specific language-based disorder of constitutional origin, characterized by difficulties in single-word decoding, usually reflecting insufficient phonological processing abilities. These difficulties in single-word decoding are often unexpected in relation to age and other cognitive and academic abilities: they are not the result of generalized developmental disability or sensory impairment. Dyslexia is manifested by variable difficulty with different forms of language, often including, in addition to problems reading, a conspicuous problem with acquiring proficiency in writing and spelling. (IDA, 1994)
Table 1 - Misconceptions concerning dyslexia.

1. Dyslexia only affects reading.
2. If a person is able to read, he cannot possibly be dyslexic.
3. Dyslexics can learn to read just like anybody else; they just progress at a slower rate. Therefore, the appropriate remediation is to repeat the same instruction but at a much slower speed.
4. Dyslexics will never learn to read.
5. Dyslexics struggle with phonics; therefore, phonics should be avoided with these students.
6. Dyslexia can be diagnosed in a preschool child.
7. All dyslexics use mirror writing. Therefore, if a student does not write backwards, he is not dyslexic.
8. All dyslexics have very poor writing skills.
9. All dyslexics are clumsy, or the converse, all dyslexics are well coordinated.
10. All dyslexics have a poor sense of direction, or conversely, all dyslexics have a superior directional sense.
11. All dyslexics have a poor memory, or conversely, all dyslexics have a superior memory.
12. All dyslexics are left-handed.
13. More dyslexics are boys.
14. Since dyslexia is genetic, if a parent is able to read, the student cannot be dyslexic.
15. Dyslexics cannot go to college.
16. Dyslexia can be cured.

The Source for Dyslexia & Dysgraphia
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Dyslexia makes many literacy-related skills harder for the people it affects. But many unique, positive, right brain attributes can also be present, such as ability in music, art, and engineering. More recently, people are recognizing dyslexia as a gift; a mind that thinks differently and creatively that may have difficulty in a traditional school setting (Davis, 1994). Additionally, Miles (1992) examined a study of eight brains from documented dyslexics. The medical MRI's showed that the brains are balanced cerebrally instead of the typical asymmetry of most of the population. The MRI's are physical proof that the brains of dyslexics are different. In a society based upon literacy the special
talents of dyslexic individuals are often overlooked and rarely acknowledged or recognized in traditional school settings.

Dysgraphia can be an additional symptom of dyslexia or can occur by itself. In order to properly understand dysgraphia it is important to also discuss dyslexia. Dyslexia is defined as “difficulty with reading” and I will discuss it in relation to dysgraphia.

People can have severe symptoms or mild symptoms of dysgraphia and dyslexia. Famous people with dyslexia have included Leonardo DaVinci, Albert Einstein, Nelson A. Rockefeller, and Sir Winston Churchill. Perceptions about dyslexia have changed in the last one hundred years. At first people did not believe that dyslexia existed. Then people believed that, with effort, the child could overcome the disability and learn to read and write. More recently, people believe that the problem exists and cannot be outgrown.

Many techniques have been developed to help children learn to read and learn to compensate for the disability.

Conflicting opinions about dysgraphia exist. The American Federation of Ophthalmologists in 1981 released the following statement creating considerable debate:

“No known scientific evidence supports claims for improving the academic abilities of dyslexic...children...with treatment based on visual training, including muscle exercises, ocular pursuit or tracking exercises, or glasses... (p.8 Nosek, 1995)”

Some professionals say that the child will outgrow the problem at puberty (Cavey 1993). Richards (1997) states that daily remedial practice works best with younger children before bad habits are ingrained. In other words, there is a window when the child is most receptive to remedial help. The key is diagnosing the disability before the window has passed. Many times teachers and parents become frustrated because they believe that the
child is lazy and not really trying. At times the child may produce exemplary work after much effort, masking the actual disability.

"Difficulties with writing often lead to misunderstandings by teachers and parents, and consequently, to many frustrations for the student. This is especially true for the bright, linguistically quick student who encounters a major stumbling block when dealing with written expression, often due to the lack of smooth, efficient automaticity in letter and word formation. These students struggle to translate their thoughts and knowledge, denying their teachers opportunity to understand what they know." Richards (p. 74, 1999)

In the last ten years, literature on dysgraphia has become more prevalent.

However, the information is not specific to how dysgraphia affects performance in mathematics, science, English or social studies. Miles (1992) collected material from other researchers’ work on difficulties in mathematics. Miles as editor and others excerpted information indicating dyslexia from the literature and compiled that information in a book of articles on mathematics and dyslexia.

Table 2 shows six authors perspectives on symptoms of dysgraphia. Note that Stracher (1990’s) gives three main categories of dysgraphic difficulties as handwriting, spelling and writing organization. Henderson (1992) three categories are sequencing, directionality and short-term memory. Cavey (1993) is more specific by detailing the type of signs to observe in children’s handwriting. Bekos (1997) categories contain elements of Stracher, Henderson and Cavey whereas Richards’s combines the information into six categories. Table 3 shows the details of Richards’s six categories. Note that a symptom in isolation is not dysgraphia. Clusters of symptoms needs to be shown to diagnose dysgraphia (Richards, 1999)
Table 2. - Symptoms of Dysgraphia

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stracher (19-?)</td>
<td>1. Difficulty forming legible uniform letters</td>
</tr>
<tr>
<td></td>
<td>2. Spelling less developed</td>
</tr>
<tr>
<td></td>
<td>3. Organization of writing</td>
</tr>
<tr>
<td>Henderson (1992)</td>
<td>1. Sequencing</td>
</tr>
<tr>
<td></td>
<td>2. Directionality</td>
</tr>
<tr>
<td></td>
<td>3. Short - Term memory</td>
</tr>
<tr>
<td>Cavey (1993)</td>
<td>1. Position of the hand, arm, body, and/or paper</td>
</tr>
<tr>
<td></td>
<td>2. Size of letters: too small, too large, erratic</td>
</tr>
<tr>
<td></td>
<td>3. Proportion of one letter or word to another</td>
</tr>
<tr>
<td></td>
<td>4. Quality of the pencil line: too heavy, too light, variable</td>
</tr>
<tr>
<td></td>
<td>5. Slant: too much, too little, irregular</td>
</tr>
<tr>
<td></td>
<td>6. Letter formation: poor circles or straight lines, lines</td>
</tr>
<tr>
<td></td>
<td>disconnected, illegible, beginning or ending strokes poorly made</td>
</tr>
<tr>
<td></td>
<td>7. Letter alignment: off the line, erratic</td>
</tr>
<tr>
<td></td>
<td>8. Spacing: margins uneven, letters or words crowded or scattered</td>
</tr>
<tr>
<td>Bekos (1997)</td>
<td>1. Preferential hand</td>
</tr>
<tr>
<td></td>
<td>2. Visual acuity/Eye teaming skills</td>
</tr>
<tr>
<td></td>
<td>3. Pencil Grip</td>
</tr>
<tr>
<td></td>
<td>4. Directionality</td>
</tr>
<tr>
<td></td>
<td>5. Vision Tracking difficulties, spatial awareness problems</td>
</tr>
<tr>
<td></td>
<td>6. Short term visual memory</td>
</tr>
<tr>
<td></td>
<td>7. Visual motor skills</td>
</tr>
<tr>
<td></td>
<td>8. Eye tracking skills</td>
</tr>
<tr>
<td></td>
<td>9. Visual perceptual ability</td>
</tr>
<tr>
<td>Richards (1999)</td>
<td>Six Categories</td>
</tr>
<tr>
<td></td>
<td>1. Clusters of symptoms</td>
</tr>
<tr>
<td></td>
<td>2. Feedback and anticipating</td>
</tr>
<tr>
<td></td>
<td>3. Rhythm and timing</td>
</tr>
<tr>
<td></td>
<td>4. Motor difficulties</td>
</tr>
<tr>
<td></td>
<td>5. Activities requiring reciprocal movements</td>
</tr>
<tr>
<td></td>
<td>6. Pencil grip</td>
</tr>
</tbody>
</table>
Table 3 – Details of Richards (1999) Six Categories of Signs of Dysgraphia

<table>
<thead>
<tr>
<th>Clusters of symptoms</th>
<th>• Cramped fingers on writing tool.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Odd wrist, body, and paper positions</td>
</tr>
<tr>
<td></td>
<td>• Excessive erasures</td>
</tr>
<tr>
<td></td>
<td>• Mixture of upper- and lowercase letters</td>
</tr>
<tr>
<td></td>
<td>• Mixture of printed and cursive letters</td>
</tr>
<tr>
<td></td>
<td>• Inconsistent letter formation and slant</td>
</tr>
<tr>
<td></td>
<td>• Irregular letter sizes and shapes</td>
</tr>
<tr>
<td></td>
<td>• Unfinished cursive letters</td>
</tr>
<tr>
<td></td>
<td>• Misuse of line and margin</td>
</tr>
<tr>
<td></td>
<td>• Poor organization on the page</td>
</tr>
<tr>
<td></td>
<td>• Inefficient speed in copying</td>
</tr>
<tr>
<td></td>
<td>• Decreased speed of writing</td>
</tr>
<tr>
<td></td>
<td>• Excessive speed when writing</td>
</tr>
<tr>
<td></td>
<td>• General illegibility</td>
</tr>
<tr>
<td></td>
<td>• Inattentiveness about details when writing</td>
</tr>
<tr>
<td></td>
<td>• Frequent need for verbal cues and use of sub-vocalizing</td>
</tr>
<tr>
<td></td>
<td>• Heavy reliance on vision to monitor what the hand is doing during writing</td>
</tr>
<tr>
<td></td>
<td>• Slow implementation of verbal directions that involve sequencing and planning</td>
</tr>
</tbody>
</table>

| Feedback and anticipating | • Copying writing |
|                          | • Spontaneous writing |

| Rhythm and timing | • Jerky handwriting |
|                   | • Speed of handwriting |

| Motor difficulties | • Tying shoes |
| Sometimes referred to as motor clumsiness | • Riding a bike |
|                               | • Throwing or catching a ball |

| Activities requiring reciprocal movements | • Copying repetitive tasks |

| Pencil grip | • Distance finger to pencil point (between ¾ to 1 inch) |
|            | • Pressure on pencil |
|            | • Angle of pencil (approximately 45° with page) |
|            | • Finger control and anchoring or pencil |
Identification and Diagnosis of Dysgraphia

Cavey (1993) lists seven early warnings indicating that dysgraphia could exist in children as:

- Fear of trying new things
- Difficulty writing
- Difficulty with before and after
- Difficulty coloring inside the lines
- Clumsiness and awkwardness in throwing or catching balls
- Uneven performance in testing, some high scores and some low scores
- Inability to copy well

The following tests can be used to determine levels of physical coordination and competency for pre-school children: The Frostig Movement Skills Test Battery (Frostig, 1972) and the McCarthy Scales of Children’s Abilities (Mc Carthy, 1972). Young children’s difficulties in skipping, one-leg balancing, catching and throwing a ball, writing and drawing can be early indicators of eye-hand coordination issues. Cavey states the tests are good for the extremes but present problems for the middle ranges (1993). For older school age children handwriting can be assessed.

The Test of Written Language-2 (TOWL-2; Hammill & Larsen, 1988) measures growth by pre- and post-testing several areas of written language. Both traditional tests and essay analysis are used. According to Cavey (1993), “the TOWL-2 is considered to be the most comprehensive and reliable norm-referenced test of written language available.”
The Wechsler Intelligence Scale for Children – Revised (WISC-III: Wechsler, 1974) is designed to measure the innate ability of a child to think, reason and learn. The WISC-III is considered the universal intelligence test standard and used the most often by school psychologists. The test is organized into two groups: perceptual-motor or performance and verbal (Wechsler 2002). The verbal portion measures a child’s verbal expression and comprehension of verbal information. The performance portion measures nonverbal areas involving the visual spatial such as puzzles and rapid visual transferring of information (Nesset, 2002). According to Cavey (1993), children with dysgraphia present wide discrepancy between ability and performance “with the verbal scale generally the highest”.

When the WISC-III, shows a discrepancy between ability and performance and informal writing samples indicate a writing disability then the Bender-Gestalt test (Bender, 1938) can be used. This tests the ability of the child to copy each of nine designs of increasing complexity. The test looks for distortion, angulations, integration and rotation of the product. In children over 10 years of age errors are rare unless there are handwriting problems. According to Cavey (1993) children with dysgraphia will average two errors per design, displaying visual-motor difficulties.

Another test that also measures fine motor skills and sensory perceptual ability is the Beery Development Test of Visual Motor Integration (VMI). The VMI test presents 24 geometric designs (Beery & Buktenica, 2002). The child is required to copy geometric designs of increasing difficulty. Visual motor development, fine motor control and visual perception of the child are measured. The test progresses gradually from easy designs to the more complex. The VMI tests results are often comparable with the Wechsler
performance scale. The test is an indicator of how well a child will be able to produce written work in the classroom (Berry & Buktenica, 2002).

The Visual Aural Digit Span Test (VADS) measures a child’s ability to remember and express numbers both aurally and in written form (2002). The test of Visual-Perceptual Skills-Revised (TVPS-R) is used to determine a child’s ability to perceive, understand and use visually presented materials. The Jordan Left-Right Reversal Test (JLRRT) is a test that assesses visual reversal of numbers, letters and words (Jordan, 2002). The Woodcock Reading Mastery Test (WRMT) contains four comprehensive subtests that measure word identification, word decoding, word comprehension, and passage comprehension (Woodcock, 2002).

**Roles of Teachers, Parents and Child**

Open and direct communication between teachers, parents and the child with a dysgraphic disability is key to helping the child succeed academically. It is difficult to fully understand a bright capable child’s frustration with handwriting without also experiencing the visual processing difficulties. Richards (1999) believes that developing empathy is key, and suggests the star simulation (see addendum) as a way for parents and teachers to begin to understand a child with dyslexia frustrations. The requirement is to draw a star within the boundaries by only looking in the mirror. The difficulty is that by only looking in the mirror the apparent motion is reversed from the intended motion.

Additionally, it is important for the child, teachers, and parents to view dysgraphia from the others perspectives to fully understand the ramifications of the disability (Cavey, 1993). The teachers and parents need to understand that the child is
working very hard and is not lazy. Just the task of copying an answer from one place to another on a piece of paper can cause the child difficulty and frustration. Now, throw in copying notes from the overhead or board to the paper when the visual processing of information is difficult. Imagine the child’s frustration when it takes him/her twice as long to write as his classmates. Cavey has a list of do’s and don’ts for parents and teachers as follows for students with learning disabilities:

1. Don’t do their work or insist on helping if they don’t want help.

2. Do help them with homework by reading the assignments to them and correcting spelling, but only if they wish you to do so.

3. Don’t embarrass them, call them lazy, or discourage them, either privately or publicly.

4. Do sustain a structured but warm atmosphere. Handle them consistently – they need to know what is expected of them. Their behavior problems are usually the result of frustration, not the cause of it.

5. Don’t excuse them from normal responsibilities or normal tasks that they can do reasonably well.

6. Do remember that “careless” errors are really indications of their learning problems, not laziness.

7. Do provide praise when they have earned it, even though there may have been only a small gain in behavior or learning.

Observant parents and teachers can become aware of the type of difficulties the child is experiencing. Strategies and compensations can be tailored to the individual needs of the
child to decrease the child's frustrations. A child with a learning disability needs patience and understanding from parents, teachers and himself/herself.

**Use of Low and High Tech Tools**

Richards (1999) has ten general types of remedial or compensatory assistance adapted from Levine (1998, 574):

- Automation of subskills,
- Scaffolding,
- Design of tasks that end at the breakdown point,
- Separation of breakdown points,
- Staging,
- Use of multiple formats,
- Recognition of strengths and affinities,
- Modeling, use of strategies, and directed retraining.

Table 4 describes interventions at the breakdown point, which is the point where the child needs to change tasks, or have the material presented from a different modality.

Handwriting for students with dysgraphia lacks automaticity. The use of the Tablet PC can be a tool used to remediate handwriting and improve automaticity through daily practice. The Tablet PC is capable of turning different individuals handwriting styles accurately into text as demonstrated at a November 2002 launching of the technology. For children with dysgraphia, this tool would allow the handwriting to be assessed by the computer with a possible outcome of more precise written work by the student. According to Nosek (1995), the computer hooks the right brain creative
functioning, capitalizing on most children with dyslexia or dysgraphia strengths. In addition, the computer is non-judgmental, patient and represents a consistent set of rules and policies under which the user operates it. Keates (2002) mentions the need to look beyond the traditional learning techniques and make the learning more assessable with the use of technology. Technology enables the student to increase performance and increase self-esteem and confidence.

Table 4 – Interventions at Breakdown Points

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Description/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation of subskills</td>
<td>Practice earlier subskills such as math facts, and practice handwriting manuscript and cursive. Practice phonological skills (goal to improve reading and spelling)</td>
</tr>
<tr>
<td>Scaffolding</td>
<td>Structure the task with mind maps or problem solving strategies. Use fill in the blank</td>
</tr>
<tr>
<td>Design tasks that end at the breakdown point</td>
<td>Sort word problems by process Use two colors to underline, one for main idea and one for key facts Use Post-its® for main idea of paragraph Paraphrase</td>
</tr>
<tr>
<td>Separate breakdown points</td>
<td>Slow down rate of speech Verbalize at breakdown point; i.e. edit the draft verbally</td>
</tr>
<tr>
<td>Staging</td>
<td>Separate tasks; i.e. separate writing into steps: brainstorming, mind mapping, writing, mechanics, proofreading</td>
</tr>
<tr>
<td>Use multiple formats</td>
<td>Use multiple ways to present material</td>
</tr>
<tr>
<td>Deploy strengths and affinities</td>
<td>Examples: Concrete presentation of math, improve reading using interests, verbalize nonverbal concepts, draw verbal concepts</td>
</tr>
<tr>
<td>Modeling</td>
<td>Demonstrations by teacher and other students Student demonstrates at the breakdown point</td>
</tr>
<tr>
<td>Strategy use</td>
<td>Show strategies to strengthen a breakdown point</td>
</tr>
<tr>
<td>Directed retraining</td>
<td>Reteach certain basic skills Allow small group or individual review</td>
</tr>
</tbody>
</table>
The following technology software can be used for compensation of skills: word processor with the spell check, handheld Franklin spell checker, inspiration or other mind mapping software (Stracher, 1990's). Henderson (1992) mentions that the use of calculators needs to be carefully monitored since dyslexics will push the wrong keys. Estimating needs to be taught when using calculators so that the answer can be checked. Cavey (1993) mentions keyboarding and tape-recording as additional low-tech alternatives. Non-technology tools such as special lined paper alternating colors, color line paper, and graph paper can help a child line up numbers or writing (Cavey, 1993). Many times children with dysgraphia have strength in the visual – spatial processes. The use of three-dimensional hands-on activities allows concepts to be developed by manipulation of objects (Miles, 1992). Mathematical language can be strengthened by the use of concrete materials (Kibel, 1992). Projects allow both visual – spatial strengths as well as weak writing skills to be practiced (Cavey, 1993). With projects the breakdown points are spread and easier for the child to manage.

**Legal aspects**

The federal law PL 94-142 Education for All Handicapped Children Act (1975) has been amended five times. The Individuals with Disabilities Education Act (IDEA '97) was the last set of amendments added. To understand IDEA there are six principles according to Policymaker Partnership for Implementing IDEA, PMP (2002):

- Free appropriate public education (FAPE) for every child between 3 and 21,
- Appropriate evaluation,
- Individualized education program (IEP),
• Least restrictive environment,
• Parent and student participation in decision making, and
• Procedural safeguards.

The intent of these six principles is to guarantee that children with learning disabilities receive the same education as other children taking into account their individual learning needs and style.

IDEA '97 clarified that school purchased assistive technology on a case-by-case basis, can be provided for a child at home and school. The child’s IEP team needs to determine that the technology is necessary in order to receive a free and appropriate education.

The IEP section has been revised stating that the child’s IEP must be accessible to each of the child’s teachers. In addition the teachers need to be informed of their specific responsibilities in regards to the IEP by a CST member. IEP accountability was amended stating that the school is responsible to assist the child to achieve the goals and benchmarks listed in the IEP. The parent has the right to ask for revisions or invoke due process if the goals are not being met.

Dyslexia is a neurologically based, often familial, disorder which interferes with the acquisition and processing of language. Varying in degrees of severity, it is manifested by difficulties in receptive and expressive language – including phonological processing, reading, writing, spelling, handwriting and sometimes arithmetic. Dyslexia is not a result of lack of motivation, sensory impairment, inadequate instructional or environmental opportunities, or other limiting conditions, but may occur together with these conditions. Although dyslexia is lifelong, individuals with dyslexia frequently respond successfully to timely and appropriate intervention. (IDA 1998)
Chapter III. Methodology

Introduction

The main participant in this study is a ten-year-old fifth grade boy, Evan with dysgraphia. The other participants in this study are the individuals involved directly or indirectly in the school related education of Evan. The participants were chosen because of the impact that they have on Evan's success or failure in school. They are his math teacher JK, language arts teacher PC, social studies teacher PM and resource teacher KK. The science teacher SF is not an active participant due to the large number of fourth and fifth grade students that she sees weekly. Initials will be used to represent participants' names. Additional data will be collected from the CSE committee who formally tested Evan prior to his IEP classification. Notes from Evan's eye doctor, PW, with explanations of his visual processing will also be included. Kumon, an after school math program will be used to show evidence of dysgraphia and mathematics. TS and I are co-coaching Odyssey of the Mind and will also collect data about Evan from his participation as a team member.

The school district where this study is taking place is thirty square miles including residential, suburban and rural areas. The student body comes from six suburban towns. The high middle class population supports quality education. The total enrollment in the eight schools is approximately 6000 students. The K-5 elementary school where Evan attends has a population of 730 students and over 100 staff members.

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2 Initials of participants.
3 Committee of Special Education.
In fifth grade, students change classes for math, reading, science, social studies and specials such as computer, art, music and physical education. Students are grouped into a high or average math class, while all other classes travel together as homerooms. Language arts are taught by the homeroom teacher. Students also have the option to learn an instrument and participate in the before school orchestra or band starting in 5th grade. Instrumental group lessons are once a week on a rotational schedule throughout the day.

**Participants**

*Brief History of Evan*

As a baby, Evan was patient, did not cry much, and expressed his wants and needs with body language and facial expressions. He showed a tonal and rhythmic affinity for music with his vocalizations. Instead of exploring his food with his hands at 10 months he had learned to use table utensils. As a toddler, he expressed his needs with pantomime, body language, and grunts. At 20 months, after three unhappy days in a ski resort day care center, he talked. His first word was “juice”. On the same trip Evan said, “Wow” when he saw the Grand Canyon. Evan said his first joke at 22 months. Evan was making a commotion in his room complaining and struggling with an object that was “stuck”. Evan started saying, “stuck” that morphed into “duck, duck,” tugging on the object. Realizing the change he then said, “quack, quack.” When Evan started pre-school he would refer to yesterday as “last day” and tomorrow as “next day”. When Evan first began to write his name at four years old, he would write from right to left and all his letters would be perfect mirror images.
In Kindergarten, Evan had difficulty completing a sequencing activity putting shapes of a triangle, circle, square, triangle...etc. linearly on a piece of construction paper. Evan demonstrated trouble completing some assignments.

In first grade Evan did not want to go to school and missed the bus frequently. He avoided writing by breaking pencils and faking asthma attacks. He visited the nurse regularly.

In second grade, Evan was much happier with school. The teacher checked Evan’s comprehension through multiple-choice questions though Evan still had difficulty with fill in the blank and short answer writing. Studying for spelling tests in the typical fashion of writing misspelled words five times did not work. Evan fought spelling practice initially, but got better as the year progressed.

In third grade Evan fought writing in the weekly journal. Early in the year the teacher recommended testing for Evan and a writing tutor. Evan’s tutor used the computer to help motivate Evan to write. Evan did not learn cursive in third grade with the other students.

An IEP was created and approved just before the beginning of fourth grade. Evan’s fourth grade teacher said that cursive was not a problem and that they would work on it. The fourth graders were expected to do all their work in cursive. Evan learned cursive but in timed tests situations made many mistakes. He was eventually allowed to take his spelling tests in manuscript. It is now in his IEP that he can take his tests in manuscript. Evan received special glasses just for reading and writing early October in fourth grade to train his eyes to work together. The glasses evidently helped Evan
overcome his reading difficulties and he progressed from reading first grade print to reading all four Harry Potter books in five weeks.

Cursive is still not automatic for Evan and he frequently refers to the cursive chart at home and school. Evan is now in fifth grade. Evan no longer has to wear the glasses all the time but should still wear the glasses for long focused work. Evan is learning but he does not always participate or show his teachers what he knows. Evan creates a wall and resists letting new people in until he is comfortable. Evan works best in smaller groups and becomes very quiet in new situations and large group instruction.

Evan participates in Kumon, an after school math program. Evan is bored because he has mastered the algorithm of division. He is not very motivated to continue to do the same 60 division problems over three or four times due to his handwriting errors.

**Teachers**

The language arts teacher (PC) is also Evan’s homeroom teacher. She is the fifth grade team leader. She expects her students to take responsibility for all aspects of their school life. She asked all fifth grade parents to please not deliver forgotten lunches, musical instruments and homework to the school. The goal is for the child to be more responsible by letting “the child take the consequence”. They will be less likely to leave materials behind the next time. She has clear expectations and when necessary gives a child warning of the consequences if expectations are not met. At the November conference, Evan was not meeting the goals and she stated the consequences that would result if he doesn’t keep his desk neat. Evan is still not participating much in her class.

The math teacher (JK) has succeeded in getting Evan to actively participate in her class. She is teaching Evan’s class with the math lab aide. The students are grouped into a
high or average math class. Evan is in the average group. The same material is being taught to both groups.

The social studies teacher (PM) has agreed to give Evan class notes at the end of each unit to prepare for his tests. Evan will still take notes in class but will also have the teacher’s notes for studying. Evan is not participating much in her class as of the November conference.

The resource teacher (KK) has Evan for spelling and sometimes writing. Evan is pulled out of class to take the state tests in the resource rooms. KK stresses the importance of Evan learning to keyboard better since it will enable him to concentrate on content versus his handwriting difficulties. Evan at this time hand wrote the state social studies test in early November because writing by hand is still faster than keyboarding.

The science teacher (SF) has Evan in class twice a week for mostly hands-on type science activities. She did not attend the first meeting with the Language Arts, Math, Social Studies and Resource teacher. She is the science teacher for six fifth grades and some of the fourth grades. She posts information on the web for students and parents besides giving the students science packets. Evan considers science his most difficult subject, yet he got his only A for the first marking period in science. I asked Evan about how he got his A and he responded, “I got 100’s on all my exit slips and did well on my science tests.”

O.M. coaches

TS and I are co-coaching an Odyssey of the Mind team of seven fifth grade boys including Evan. TS has taught religious education for the past eight years. TS co-coached
a fourth grade Odyssey of the Mind team last year that placed third locally. TS is currently working as a classroom aide and substitute teaching.

Eye doctor

PW screened Evan in September 2001, and prescribed glasses to retrain Evan’s eyes to work together. The glasses allowed Evan to move from reading first grade print to the first four Harry Potter books in five weeks. Evan was examined again the following month and told to continue wearing the glasses for reading, writing and any near focus work. Evan was told that the more he wears the glasses then the sooner he will not need the glasses. Since the glasses worked, additional eye training was not prescribed. PW saw Evan for a yearly follow up September 2002. Evan now only needs to wear the glasses for long focus work.

CST personnel

Members of the CST committee evaluated Evan in February 2001 during third grade. The certified school psychologist (JS) administered the WISC-III test to Evan. The current diagnostic techniques used are as follows:

- Wechsler Intelligence Scale for Children-Third Edition (WISC-III)
- Beery - Developmental Test of Visual - Motor Integration (VMI)
- Visual Auditory Digit Span (VADS)
- Test of Visual Perceptual Skills - Revised (TVPS - R)
- Jordan Left Right Reversal Test
- Draw – A – Person with Inquiry (DAP)
- Incomplete Sentences
- Individual Interview
- Classroom Observations
- Teacher Reports
- Review of School Records

Evan showed strength in abstract reasoning and weakness in psychomotor speed. Results:

- Verbal IQ: Superior
- Performance IQ: High Average
- Full Scale IQ: Superior

She recommended that Evan be considered a student with a learning disability in written language and that he receive special education support. In addition, JS made the following classroom recommendations for Evan:

1. The guidelines/strategies for students with attention deficits should continue to be implemented in the classroom.

2. Utilize multisensory teaching strategies with the use of visuals and manipulatives whenever possible. Write multi-step directions on the board.


4. Use brainstorming, graphic organizers and peer sharing to help with writing rough drafts.

The reading specialist also with initials (JS) administered the following tests to Evan:

- Woodcock Reading Mastery Test
- Wechsler Individual Achievement Test
Informal Writing Samples

Due to Evan's difficulty with the writing assignments of third grade, JS supported the Pupil Service Team's recommendation to classify Evan with a Learning Disability.

The speech/language pathologist (KZ) evaluated Evan over six thirty-minute sessions in third grade. She recommended that Evan attend speech improvement once a week for thirty minutes to address pragmatic language. She also recommended that due to the discrepancy between Evan's cognitive skills and his writing skills and speech/language skills that Evan be considered a student with a learning disability.

CL observed Evan in June of 2001. CL is the instructional area leader for special education. She is responsible for assigning technology grant money if required by the IEP.

Principal

(SC) is informed and knowledgeable about special education. She attends the CSE meetings. When I gave (SC) background about my thesis and Evan she commented that art and handwriting are different sides of the brain. Evan is drawing using the right side of his brain and is using the left side to write. She is supportive of special education.

Kumon

I have spoken with the Kumon director about Evan and the dysgraphia. He is very set in drilling to perfection.
Data Collection

Research Design

This study is designed to obtain the following goals:

1. Enable Evan to improve his academic performance despite his poor handwriting.
   a. Use Richards’s dysgraphia diagnostic tools to show the degree of Evan’s dysgraphia.
   b. Use appropriate technology to enable Evan to improve his academic performance such as the Tablet PC with handwriting recognition.

2. Affect teachers’ perceptions of capabilities, intelligence and performance of Evan, who has dysgraphia.
   a. Change the way that lesson plans are written so that they can be easily used to allow a child with dysgraphia more independent learning using both technology and traditional methods with pencil and paper.
   b. Have teachers think about font and layouts of worksheets so that they are assessable to all students including those with learning disabilities.

Data Sources

Samples of Evan’s Work

I will collect samples of Evan’s work. The samples will show his skills and his difficulties. The Tablet PC will be used to compensate Evan’s handwriting issues.
1. Handwriting samples
2. Spelling samples
3. Writing samples
4. Detailed drawing samples
5. Kumon samples
6. Smartboard samples
7. Tablet PC samples

Observations of Evan

1. Journal
2. Odyssey of the Mind
   a. Video
   b. Notes
3. Teacher
4. Parent

Transcripts/Notes
   a. Meeting Notes
   b. Telephone conversations
   c. Transcripts

Other
1. Interviews/Questionnaires
   a. Evan
   b. Teachers
   c. Selected CST committee
2. **Formal Testing**

   a. *Initial tests results for IEP 2/01*

   b. *Vision tests noting changes*

**Instruments and Materials**

Use the Smart Board to check if the Tablet PC would be feasible. The Tablet PC handwriting software allows the writing to be recognized anywhere on the screen. Evan would have to space his words to *have it read* properly that could actually train him to space his words.

Use the Tablet PC handwriting recognition feature to assist Evan with his handwriting. Explore more formal classroom use of the Tablet PC in social studies, spelling and math in January, February. I will transfer the lesson worksheets to the Tablet PC so that Evan can *take his* notes and do his math using the Tablet PC handwriting recognition technology. Since handwriting and note taking in social studies becomes more difficult each additional year in school for Evan, *this is a perfect application of the Tablet PC.* The plan is to scan the worksheets into the Tablet PC. Evan can take the notes on the Tablet PC. Using the handwriting recognition features of Microsoft’s professional XP *software* Evan can transfer his notes into typewritten text. The goal is to encourage an improvement in Evan’s writing and handwriting and his ability to study for tests.

Use pencil and paper to see if there is improvement in Evan’s handwriting after working with the Tablet PC.

Use Richards diagnostic test for dysgraphia with pencil and paper, *on the* Smartboard and on the Tablet PC.
Use the keyboard of the Tablet PC to help Evan increase his keyboarding proficiency.

Use the Richard’s star simulation activity with teachers.

**Procedures**

*Timeline Data Collection*

**September 2002**
- Start the project,
- Collect data on Evan through March,
- Begin journal entries,
- Research for the literature review.

**October 2002**
- Literature Review,
- Transcription of initial meeting with teachers to enlist support,
- Notes of conversations with participants begun,
- Odyssey of the Mind data collection begins Oct. 22. Video taping the meetings.
- Gather information about possible grants.

**November 2002**
- Collecting data on the Tablet PC handwriting recognition features,
- Use the Smartboard with Evan to try the handwriting recognition features,
- Use Richards sample figures for dysgraphia diagnosis (see addendum),
- Notes Parent, teacher and child conference with homeroom teacher,
• Set up meetings with classroom teachers early December to interview and gain buy-in for using the Tablet PC in the classroom.

• Set up meeting with KS, SJFC special education faculty member to discuss interview questioning.

December 2002

• Schedule meetings with the math and social studies teachers individually to propose a plan for using the Tablet PC in the classroom with Evan.

• Proposed plan to include using the Tablet PC for an entire unit that can be adapted to the Tablet PC. I will do the work necessary to put the information into the Tablet PC so that it will not require additional work on the part of the classroom teachers. Determine lesson plan units to be used dependent on delivery of the Tablet PC.

January and February 2003

• Early January look into writing a proposal for an International Dyslexia Association Grant. The dates and timeline should become available January 1, 2003. See addendum for last year’s guidelines. Use the data with Evan as a pilot study. Broaden the study to include other children with dysgraphia using the Tablet PC to compensate.

• Pilot the use of the Tablet PC in the classroom using teachers existing unit plans. Continue to collect data on Evan. Collect any information from Evan’s classroom portfolios from the teachers.

• Possibly develop another questionnaire at the end of collecting the data using the Tablet PC. Use the questionnaire to understand the teachers perspective on having
the Tablet PC technology in the classroom and the benefits for a learning disabled child.

- Do the final data collection using above techniques.
- Continue to analyze the data. Begin writing the results and the discussion.
- Write and submit grant proposal to International Dyslexia Association.

Early March 2003
- Complete the analysis of the data and write the final copy of the results and discussion of the thesis with plenty of time to edit.

March 2003
- Complete the final editing of the thesis.

April 2003
- Prepare the presentation

Unit and Lesson Plans

At this time I don’t know what unit plans will be chosen by the math and social studies teacher for me to adapt to the Tablet PC. This part of the study is also dependent on the delivery date of the Tablet PC now that they are on backorder do to a shortage of licensing agreements from Microsoft. Right now during parent, student, teacher conferences is not the time to approach them with the idea. I will have better luck getting buy-in after Thanksgiving. I need to have more conversations with the special education leader for the building about the tablet PC so the request to the teachers is not coming just from me but from others as well. I need everyone’s participation in order to have a reasonable outcome for this part of the data collection. Evan also has to be comfortable being the only child with the laptop in the classroom.
Ancillary worksheets, quizzes etc.

Not available at this time until know delivery date of the Tablet PC and the units being taught.

Other data Sources

Look at data to see how Evan is responding to the environment.

Tracking of Evan through the system

Triangulation of Data

1. Data from the certified school psychologist, reading specialist, speech/language pathologist, instructional area leader for special education, interview of Evan, school records, teacher input, and parent input to determine that Evan has a learning disability in written language.

2. To determine underlying causes of the written language disability I started reading about dyslexia for this research. When Evan was in first grade he showed some dyslexic type signs such as reading saw as was and was as saw. In addition Evan easily tired when reading and needed help tracking the print on the page. Evan in second grade read the package print prevalent in the pokeman magazines rather than pleasure books. Fourth grade the glasses were magic and allowed Evan to focus for long periods of time and read print easily for the first time. Evan had major handwriting issues also in first grade and avoided writing by faking asthma attacks, breaking pencils or avoidance of the task. Dysgraphia is also mentioned in the literature in connection to dyslexia. Through observations by myself, using Richards (1999) diagnostic tools for dysgraphia, the formal testing
in third grade, and selected work of Evan, Evan learning disability is shown to be dysgraphia.

3. Technology tools to help Evan. The new Tablet PC may be a useful tool to improve Evan’s handwriting, as demonstrated at the Rochester launching on November 14, 2002. I want to use the Tablet PC computer handwriting recognition tool as a training tool for teaching Evan better handwriting techniques. Evan is resisting practicing his handwriting skills with pencil and paper. The hope is that the novelty of the Tablet PC and Evan’s love of computers will encourage Evan to practice handwriting skills. Possibly develop interesting software handwriting lesson drills to be used on the Tablet PC. I will need some help in this area. The Tablet PC will be able to give Evan immediate feedback on legibility of his handwriting. Triangulation will include the Tablet PC data, observation of Evan when writing with pencil and paper and Richard’s diagnostic tools to look for improvement in automaticity of writing.

4. My Journal, teacher’s observations and Evan’s schoolwork legibility to look for improvements in Evan’s classroom performance and handwriting, Kumon work.

5. To look for improvement in active participation, video of OM, teachers observations, interview of Evan and pragmatic language improvements as determined by formal testing.

6. Interview special education process from
   a. Teachers’ perspectives
   b. Parents’ perspectives
   c. Student’s perspective
Chapter IV. Results and Analysis

This chapter is under construction. At this point just a collection of results and questions chronologically. Not organized, or completely analyzed yet since not all the work for this chapter has been completed. The information is important since it is influencing my methodology.

Cursive writing package

Given to Evan on 10/1/02 by KK(resource teacher)

Evan thinks stupid and lacks motivation to practice though he showed interest in how the letters were grouped. As of 10/29/02 still can’t get Evan to practice the writing packet. Evan’s comment today was that he would rather write a paragraph in cursive than write the individual letters. “I know the letters.” Would the novelty of Tablet PC get us through this difficulty of getting Evan to practice the writing skills that others his age have already mastered? Have we missed the magic window where Evan would have willingly cooperated?

Goals of Evan’s Teachers

Evan’s teachers would like to see the following from Evan:

- Increase participation in classroom instruction,
- Study for all his tests in chunks over the course of a few days,
- Write down homework,
- Keep his desk neat by putting all loose papers in his docket.
**DataCollection**

*Types of dysgraphia errors*

Oct. 7 02

On October 1, 2002 Evan’s math class was given the grains of rice problem. If you have one grain of rice on day one, then how many grains of rice do you have on day thirty? Evan was required to copy and track from left to right when doing the math problem. In school cooperate work with a partner on the first fifteen days Evan had few mistakes. At home the disability became evident when he could not copy correctly from one box to the next. A poorly written 21 became a 4. In addition, Evan would leave out numbers when transferring the answer from one box to the next box laterally. Left to right copying was very difficult. He wanted to do the problem by multiplying by two instead of doubling by adding, but followed the instructions of the teacher to double. Would Evan have found this problem easier if he had been allowed to do most of it mentally and just write down the answer? Would Evan have found this problem easier in a vertical format versus the left to right format that contributed to many handwriting errors? When Evan frustration level reached a peak with this assignment I helped by having him read the number he got to me. If it was correct then I would reread the number to him so he could write it down using his good listening skills instead of his poor copying skills. If it was incorrect then we checked the handwriting together.

**Spelling**

Analyze some spelling tests. Assess handwriting and phonological spelling errors.

**Math**

Collect sampling of Evan’s work showing the type of dysgraphic type errors that may be affecting Evan’s placement due to lower math scores. Review Kumon. Evan may
be willing to work on a lower quantity of math problems each night with me. I could continue to work basic skills and problem solving while moving Evan forward into fractions. Evan absolutely hates not being allowed to progress due to his dysgraphia.

Writing and Art
Show the difference in Evan’s work when he is using the right side of his brain for art and the left side for writing. Collect the homework assignment for math about his angel soft toilet paper to demonstrate.

10/27/02 Evan did Kumon – two-digit division. Evan does not like to write. He found a shortcut pattern for dividing 21 into many different numbers. (Example in addendum) Evan would look at the previous problems’ dividend and subtract to get the new remainder rather than doing the division algorithm.

Motivation and Attitude
Haven’t research but is an area of concern. How much does the disability affect Evan’s motivation, attitude and frustration level?

Anecdotal comments from Evan showing visual spatial thinking
10/29 When I close my eyes I can see everyone in my classroom. I can even picture what they were wearing.

Teachers
Initial transcription – recorded on mini disk 10/15/02
Summary Key Points: Evan avoids anything frustrating, and writing down his homework
Ideas: Use inspiration or similar program to encourage the typing since Evan enjoys the special features of the program.
Recommendations: Continue working on keyboarding, continue working on organization, encourage affective participation, continue using glasses as needed for focusing and tracking, communicate anything unusual or unique

Conversation with JK – 10/24/02
Separate Evan and JP. Move Evan back to the front. JK is considering moving him to center front. Evan was on the right front of the room. (Got 101 on place value test) Is location in the room significant to how well Evan processes information? Evan in center back with JP (Got a 60 on arithmetic, multiplication, addition, subtraction and word problems test). Is sitting next to his buddy the problem or is it a combination of sitting next to his buddy and location. One of the problems he had to scan from left to right to complete. When he made corrections he skipped that problem saying it was too hard. Is the material too hard or is the tracking making it too hard?

10/28/02 – JK moved the two groups of four desks. Evan’s group with the move changed location so that Evan is separated from Jacob. Evan is now center left front

Conversation with SC (Principal) – 10/29/02 7pm
Gave her a little background on the thesis, research and Evan. Explained Evan’s dysgraphia and how he can draw but not form letters carefully. SC commented that art and handwriting are on different sides of the brain. I asked about retesting since Evan has shown major changes in reading with the glasses. I told her about Evan getting the glasses. Before glasses Evan read first grade print and after glasses Evan read the Harry Potter books in five weeks.

I made the request that Evan should be retested due to major change in reading with the glasses. In addition I asked about the PC tablet. She seemed for it especially if I
can get one for home and one for school free as part of my research. Since it is new on the market and has not been tried she is not sure it would be approved for expenditure. Request meeting with PST to request retesting for following reasons: Significant improvement in vision training with the glasses. Formally update IEP before middle school due to rapid changes. Have a Tablet PC become part of Evan’s IEP. Check out voice to text software.

10/01

Eyes not tracking together

Closing one eye to read and write

Doctor explained that in order to write Evan uses one eye to read, then the information needs to be transferred so that he can then write using the other eye

Evan given glasses to retrain his eyes to work together even though he has 20/20 vision

Narrow range of vision

10/02

Eyes working much better

20/20 near and far field

Evan’s accommodation much higher than a year ago

Current prescription just fine

Should wear his glasses when working for a long time but can probably skip the glasses for short times.

Request meeting with PST to request retesting for following reasons

Significant improvement in vision training with the glasses

Formally update IEP before middle school due to rapid changes
Have a laptop and the Tablet PC become part of Evan’s IEP

Voice to Text software such as Dragon Naturally Speaking

**Video – Odyssey of the Mind**

**Interview Evan**

What makes Evan respond to TS and participate at OM meetings and the Math teacher K but as of Nov. conference not the other teachers? Why is Evan refusing to let them get to know him better? Why is Evan putting a wall around himself in some situations but not others?
Chapter V. Discussion
References


Appendices

My Thesis Journal

9/08/02 - Background on Evan – 10-year-old male in fifth grade

- Crawled for one week then went straight to walking at about eleven months.
- Spoke with gestures, facial expressions, and grunts until 20 months.
- Has three older sisters 21, 19, and 16 years, who maybe answered his every need.
- All Evan’s needs met by his sister’s and the environment.
- At twenty months put Evan in a day-care at a ski resort for four days. Evan cried for three days until he learned to say juice and make his wants known verbally. Later on the same trip after Utah Evan said WOW! To describe the Grand Canyon.
- Between 20 months and 22 months Evan was making a commotion in his room complaining and struggling with a stuck object. He said, “duck, duck, duck, quack, quack.”
- Evan loved pre-school. If I did not arrive before naptime, then I had a difficult time getting Evan to leave before 5:30. This pre-school daycare was a training ground for high school students and college students interested in early child development at a local high school. Too many adults and too much help!
- Evan would mirror write his name from right to left at pre-school if he started on the right hand side of the page.
- Evan demonstrated difficulty-completing tasks in Kindergarten. One assignment that Evan did not complete involved putting some concrete paper objects in the same sequence. Ex. triangle, circle, square, triangle...

- From 8 months until sometime in first grade Evan was read three books before nap and three books before bed. Started reading chapter books in first grade and then stop reading to Evan to encourage him to read on his own not realizing the disability completely.

- First grade Evan was calling his teacher a witch by the second week of October. Evan did not want to get out of bed or on the bus. I conference with the teacher and saw immediate improvement in his attitude. I do not know what changed in the classroom. Evan still referred to her as a witch but was more willing to go to school. Evan was constantly at the nurse’s office being treated for asthma during the school day. Evan was put on preventative medicine but was still showing up in the nurse’s office regularly. Evan still having trouble in school so in February I observe a class. Teacher asked Evan his definition of big and Evan ignored the question and refused to look at the teacher. He was facing out of the circle group with his back to the teacher. Later the children were asked to read a story silently. The students returned to the large circle and the teacher called on Evan to tell the sequence of the story. Evan still not looking at the teacher correctly told the sequence. The teacher responded accusingly, “How did you know that.” Evan crawled under the easel etc. The same day I was returning the art ambassador materials to the teachers’ lunchroom and walked in while the Evan’s teacher was talking about Evan crawling under the easel. She turned green when I said hi and I
didn’t make more of an issue even though I had a perfect opportunity right in front of the principal. At this time I requested that daily readers be sent home with Evan. The aide sent home books with one word on each page. At this point I took over teaching Evan to read. Evan read the tree-house mystery books out loud to me using a ruler to track the line of print. This is when I first noticed that saw became was and was became saw etc.

- Evan did not seem to learn his phonics or writing in first grade. The day I observe I watch him break the leads on all ten pencils when he had a writing assignment.

- One day the nurse called me to say that Evan was back in her office complaining that he could not breathe but that she could not give him any more medicine and that I should check him when he got home. About 20 minutes later her arrived home, jumped off the bus and proceeded to run around the yard. I called the nurse back and suggested that maybe he was faking asthma to get out of class and writing. The next time Evan showed up she made him bring his work and do it. He never returned to her office that year faking an asthma attack.

- In second grade Evan had a wonderful teacher. I suggested to the principal that Evan had a horrible year and we were losing him academically. The principal placed him perfectly. The teacher noticed that Evan had difficulty when he had to write out answers to show comprehension. The teacher also showed us multiple-choice comprehension reading assignments that Evan did correctly. The teacher worked hard keeping Evan on task. SAT scores were high in certain areas. Evan fought learning to spell in the beginning of the year but with persistence had decent spelling marks.
• In third grade once again Evan got a teacher who thought that Evan was not very capable. Evan’s problem with writing was evident early in the year. It was WWII to get Evan to write in his journal. Evan was being considered for testing and evaluation. In the meantime the teacher gave us the name of another teacher in the building who was getting good results with reluctant writers and suggested we call her to tutor Evan. The tutor was wonderful and immediately recognized Evan’s intelligence. She used the computer extensively. I can probably find out exactly what she did with Evan. Evan started to like writing a little bit more with her positive attitude and help. Evan was evaluated and was officially classified in August before 4th grade. His third grade teacher seemed to be surprise with how intelligent Evan tested. The team reviewing Evan’s records suggested that I consider ridilin for his focus problems. They also gave me a name of an eye doctor specialist.

• In fourth grade Evan was assigned to a teacher who taught him to write in cursive (which is taught in 3rd but he didn’t learn. His cursive handwriting had very little in it). All assignments in fourth grade were to be done in cursive. His teacher told me not to worry about it that she would take care of it. He tried very hard. One assignment that was about a page and one half took Evan all week to complete in cursive but he did it. Evan was also to take his spelling tests in cursive. Eventually Evan was allowed to do his spelling tests in manuscript and his spelling scores went up. I got it written into his IEP at his annual review that Evan should be allowed to do all his tests in manuscript but should continue to practice his daily work in cursive. Evan’s reading teacher knocked off 5 points on one assignment
where Evan wrote the assignment on the back of the paper. Evan and his group had a decent score until the 5 points were knocked off. It didn’t seem to bother Evan so I suggested that he might want to make sure the paper is the right way so he can maximize his points. Evan is highly motivated by projects, and less motivated with drill work, as was demonstrated with his creative creature for science and his Eli Whitney project for reading. For the Eli Whitney project Evan read the book taking notes on each chapter over the course of two weeks. I was impressed with his independence in completing the assignment even though both projects required writing. Evan was in resource for writing. Evan showed low motivation and achievement at times.

- Evan is now in fifth grade. He will be returning to the vision eye specialist on the 27th of September. All of Evan’s classes are heterogeneous except math. Evan has been placed in the average group with a teacher and an aide. The group includes students average to low. In fifth grade there is a high group and average group for math instead of the three groups like 4th grade. Evan still goes to resource for writing and sometimes spelling depending on what the teacher sends with him.

- Milestones – Evan learned to tie his shoes and buckle himself into the car right before his 5th birthday. Evan learned to skip at 3 in pre-school. He learned to ride a bike after his 8th birthday. Motivation so he could bike with friends. Evan shows resistance to trying anything new. Learning to swim, violin biking etc. It has gotten much better since his eyes were retrained with the glasses. He would like to try martial arts. How much did his visual play in his resistance to new things?
9/17/02 - Showed Evan Lattice Multiplication – Evan observed process but did not do himself. His Kumon errors decreased from 14 out of 34 down to 4 out of 34.

9/27/02 – Evan loves to play Roller Coaster Tycoon. Has requested Roller Coaster Tycoon 2 because does not include any of the budgeting constraints i.e. mental math. I am resisting the purchase since I like the educational properties of the original game.

Evan also has some Nintendo games that he has played to mastery such as Mario Cart, Star Wars and Legend of Zelda.

9/28/02 – Evan played with Izzi, a tiling game of black and white cards with geometric shapes. In the last week he has had it out numerous times. He likes to figure out what the different shapes could represent as he plays. Evan plays with Lego’s daily.

- Evan’s Kumon today had numerous handwriting and carrying errors. Two’s became sevens, one’s became four’s and zero’s became sixes.
- Evan violin practicing was good today. In addition, Evan was singing a lot today. He worked out the bowings and fingerings on Happy Farmer review piece. He practiced Minuet III minor part section 10 times as instructed, and worked on Bach’s Gavotte in G minor fingering and bowing.
- Evan’s mind was in a very creative mode today. Did the creativity mode affect his ability to focus and accurately do his math? Math is a left brain activity while music is right brain.
- In the car to AS to play Evan was telling me that if he has the time he wants to make an instrument that combines the treble and base clef into a new clef.
- Evan has been drawing a lot lately. Most recent drawings are different kinds of weapons.
I am thinking that Evan needs daily handwriting practice for both letters and numbers. Since his manuscript is legible most of the time, cursive is what needs the most work right now.

Are learning problems created in boys by teaching boys and girls in elementary schools together – addressing learning styles mastered first by girls?

10/01/02 – Evan’s math assignment today was to figure out the grains of rice on day 30 if start on day 1 with one grain of rice and double it each day. Evan’s dysgraphic learning disability made this assignment difficult. Dysgraphic errors were as follows:

- Handwriting errors, 6’s became 0’s, 0’s became 6’s etc.
- Dropping digits when recopying.
- Turned a 21 into a 4 when transferred laterally to the next box
- Was able to accurately complete the assignment when read the answer and then I read the answer back to him so lateral coping was no longer an issue.

Some future strategies to try

- Teach Evan to double check what he writes to compensate.
- Allow Evan to use multiplication by 2 instead of doubling.
- Allow less writing to complete assignment and more mental arithmetic that would decrease the chances for handwriting errors.
- Set up a vertical table instead of a calendar with lateral copying requirements. Easier to check his handwriting vertically. Left to right copying much more difficult than vertical copying.

10/01/02 - Cursive writing pack

Given to Evan by KK (resource teacher)
Evan thinks stupid and lacks motivation to practice though he showed interest in how the letters were grouped. As of 10/29/02 still can’t get Evan to practice the writing packet. Evan’s comment today was that he would rather write a paragraph in cursive than write the individual letters. “I know the letters.” Would the novelty of Tablet PC get us through this difficulty of getting Evan to practice the writing skills that others his age have already mastered? Have we missed the magic window where Evan would have willingly cooperated?

10/01/01 - Eye doctor appointment

Eyes not tracking together

Closing one eye to read and write

Doctor explained that in order to write Evan uses one eye to read, then the information needs to be transferred so that he can then write using the other eye

Evan given glasses to retrain his eyes to work together even though he has 20/20 vision

Narrow range of vision

10/02/02 - Eye doctor appointment

Eyes working much better

20/20 near and far field

Evan’s accommodation much higher than a year ago

Current prescription just fine

Should wear his glasses when working for a long time but can probably skip the glasses for short times.
10/07/02 - Types of dysgraphia errors

The doubling of rice for 30 days starting with one piece of rice was assigned. In school the students worked in pairs finishing the assignment individually for homework. In school the cooperated work helped Evan though on day 15 the students had an error. Evan was required to copy and track from left to right when doing the math problem. At home the disability became evident when he could not copy correctly from one box to the next. A poorly written 21 became a 4. In addition, Evan would leave out numbers when transferring the answer from one box to the next box laterally. Left to right copying was very difficult. He wanted to do the problem by multiplying by two instead of doubling but followed the instructions of the teacher to double. Would Evan have found this problem easier if he had been allowed to do most of it mentally and just write down the answer? Would Evan have found this problem easier in a vertical format versus the left to right format that contributed to many handwriting errors? When Evan frustration level reached a peak with this assignment I helped by having him read the number he got to me. If it was correct then I would reread the number to him so he could write it down using his good listening skills instead of his poor copying skills. If it was incorrect then we checked the handwriting together.

Evan worked on his writing packet. Some resistance though he did thumb through the packet after completing practice with a’s and d’s. The loops method of practicing and grouping similar motion letters did catch his attention. I pointed out that aspect of the packet before he began writing. Evan has great difficulty forming the letters between the lines.
10/10/02 – Conversation with PC to schedule initial meeting date with teachers and resource teacher.

10/15/02 - Summary Initial transcription – recorded on mini disk

Summary Key Points: Evan avoids anything frustrating, and writing down his homework

Ideas: Use inspiration or similar program to encourage the typing since Evan enjoys the special features of the program.

Recommendations: Continue working on keyboarding, continue working on organization, encourage affective participation, continue using (and reminding Evan) glasses as needed for focusing and tracking, communicate anything unusual or unique

10/15/02 – Evan very quiet in front of OM peers to choose topic for Odyssey of the Mind.

10/16/02 – Meeting with Kris. Tablet PC and Dragon naturally speaking software talked about.

10/24/02 - Conversation with JK

Separate Evan and JP

Move Evan back to the front. JK is considering moving him to center front.

Evan was on the right front of the room. (Got 101 on place value test) Is location in the room significant to how well Evan processes information? Evan is sitting in center back with Jacob. (Evan got a 60 on arithmetic, multiplication, addition, subtraction and word problems test). Is sitting next to his buddy the problem or is it a combination of sitting next to his buddy and location. One of the problems he had to scan from left to right to complete. When he made corrections he skipped that problem saying it was too hard. Is the material too hard or is the tracking making it too hard?
10/28/02 – JK moved the two groups of four desks. Evan’s group with the move changed location so that Evan is separated from JP. Evan is now center left front.

10/26/02 – The goal is for Evan to recognize and understand ramifications of disabilities realizing his strengths and weaknesses.

10/27/02 - Evan did **Kumon** – two-digit division. Evan does not like to write. He found a shortcut pattern for dividing 21 into many different numbers. (Example in addendum). Evan would look at the previous problems dividend and subtract to get the new remainder rather than doing the division algorithm.

Motivation and Attitude - Haven’t research but is an area of concern. How much does the disability affect Evan’s motivation, attitude and frustration level?

10/29/02 Anecdotal comments from Evan

When I close my eyes I can see everyone in my classroom. I can even picture what they were wearing.

Evan changed the lateral problem 95 X 8 = into 261 when he transferred his answer. (see **Kumon** sheet)

```
   8
339  760
```

10/29/02 - Conversation with SC (Principal)

Gave her a little background on the thesis, research and Evan. Explained Evan’s dysgraphia and how he can draw but not form letters carefully. Sarah commented that art and handwriting are on different sides of the brain. I asked about retesting since Evan has shown major changes in reading with the glasses. I told her about Evan getting the
glasses. Before glasses Evan read first grade print and after glasses Evan read the Harry Potter books in five weeks.

I made the request that Evan should be retested due to major change in reading with the glasses. In addition I asked about the PC tablet. She seemed for it especially if I can get one for home and one for school free as part of my research. Since it is new on the market and has not been tried she is not sure it would be approved for expenditure.

Request meeting with PST to request retesting for following reasons: Significant improvement in vision training with the glasses. Formally update IEP before middle school due to rapid changes. Have a Tablet PC become part of Evan's IEP. Check out voice to text software.

10/30/02 – Get the school involved in looking at the Tablet PC. Contact CL who is responsible for distributing and writing technology into an IEP.

10/31/02 – Talked to KK about the Tablet PC – grant possibilities etc. She told me to talk to CL chairperson of special education department. Left message for JN pupil services about researching grants. Looked into Bill and Melinda Gates Foundation and the Tremaine foundation as sources for grant money.

11/01/02 – JN told me to talk with PB in relation to grants. Call PB after the Tablet PC launches to share information.

11/02/02 – Talked with my dad. Need to talk with J at the office about Tablet PC. In addition, need to get my dad to write and send his story. Seems to have issues with handwriting that lowered his grades at Berkeley. There is more to this story.

By being open about Evan's dysgraphia many people have shared stories about their own children or themselves and handwriting issues.
11/04/02 – CL also wants the Tablet PC information from the launching on 11/14/02 in Rochester. CL does the grants and is at MCE on Wed.

Talked with director of Kumon about Evan’s dysgraphia and that he has more mistakes because handwriting errors. He believes that Evan just not putting in enough effort, and needs to put in more effort. There is a need to educate this man but I am not sure he is ready to listen. I asked that he moves Evan on that he has the concepts and algorithms. He is not sure because of the number of mistakes Evan makes.

11/08/02 – H perception from meeting. H thinks that C was trying to screen Evan for depression. Asking questions like – Do you have friends over? What do you do when you get home from school? I am wondering what is happening in school to make the teacher believe that Evan is unhappy. I don’t want to create problems where none exist.

11/13/02 – Meeting with Kris. Talked about using Richards techniques for screening dysgraphia on the Smartboard noting Evan’s timing etc.

11/14/02 – Attended Tablet PC launch. Handwriting recognition of the software is excellent. The Acer Tablet PC was passed around and the software recognized a variety of type of writing. It is a viable training tool for Evan. Parsing allows the writer to write anywhere on the screen and the writing will be reorganized.

11/16/02 – Evan practices on Smartboard to determine if giving him a Tablet PC would be useful. Evan played at first becoming more proficient using proper pressure with the pens and using his finger. I then had Evan so Richards dysgraphia screening. Evan had fun playing with the different colors and the erase feature. Evan did not want to have his work saved though we did manage to get some samples. On some of the samples Evan is not forming his p’s in the most efficient manner.
11/18/02 – e-mail to JK, Evan’s math teacher

Evan has an assignment in his docket without a grade, so I think he didn’t turn it in though it is complete.

The order of operation assignment was understood however; Evan had difficulty consistently reading the font. He read multiplication as addition, division as addition. I don't know if his glasses would have helped. I circled a few on his paper so you can look closer also. Evan will need some strategies in order to catch these dysgraphic type errors.

In the middle school they underline the operation to be done next. Then the answer is written below. I showed this process to Evan. However, when Evan went to bring the other number down to finish the problem he did not necessarily copy it correctly or the operator correctly. When Evan worked the problems mentally he more likely finished with a correct answer. Presents a dilemma when he needs to show his work on tests and state tests. One of the problems he turned the 6 into a 0 before he was done.

After conferences are over, possibly early Dec. can we sit down and talk again. I would like to share what I am planning so far for my thesis methodology, what I am observing, and throw some ideas past you. In addition, if you can share any observations you have made so far I would appreciate it.

Thanks,
Cathy

11/18/02 – E-mailed Evan’s math teacher. Goal is to have the teacher’s think about layout and fonts when setting up worksheets to make them more accessible to all
students. I am looking to see if this will change over the course of the time I am doing my thesis data collection.

11/18/02, Monday – Evan did not bring home his spelling words, nor his pre-test. Last week he celebrated that because of the state social studies exam he didn’t have any spelling. This is a pattern that has repeated many times this year. He lost TV and Nintendo for a month the last time. I have asked him to bring them home tomorrow. I will call his homeroom teacher PC and resource teacher KK. He does not like to do spelling.

11/19/02 – Spelling words did not come home.

11/20/02 – Met with WR special education about interviewing. Will develop the questions to ask the teachers. Outcome of meeting to prevent collusion, be specific to the subject each teacher teaches.

11/20/02 – Spelling did not come home again. Got the list from a neighbor. Gave Evan a pre-test so he could write the sentences for the ones missed. Sentences of missed spelling words are due on Thursday. Evan wrote a great paragraph using the words. By going to resource for spelling is Evan not being held accountable for the classroom work? Evan also did not bring home a four-page math quest review packet. He was pulled out of math for a music lesson. His math teacher delivered the homework to his homeroom. Evan failed to put the work in his docket and found it missing when he went to start the homework. Size and font on the worksheets seem to play a role in Evan’s ability to raise his performance level.

11/20/02 – Met with KS to talk about interviewing and questionnaires techniques to get teachers perspectives about Evan and dysgraphia. Begin to develop interviewing and
questionnaire questions to obtain teachers' perspectives about dysgraphia and Evan's performance in the classroom. Want to try and develop a questionnaire that would limit collusion.

11/20/02 – Call to order the Tablet PC and find out potential delivery date.

12/02/02 – Compose a letter to ask for formal retesting of Evan due to major changes visually. Timing is important. Do not want the testing to take place in December or January when Evan's college-age sisters are home and the routine is disrupted. Targeting to have testing in February.
Odyssey of the Mind Lesson Plans

10/25

Spontaneous

- Important part of competition (100 points)
- Get good at it by practicing!!
- Learned skill – tricks to learn
- Involves teamwork and the ability to think on your feet
- Different kinds of problems – 3 types
  - Verbal
  - Hands-on
  - Verbal/hands-on
- May not skip your turn, repeat or pass
- If a team member is stuck, the team is stuck
- We will teach you what to do if you get stuck (tricks and techniques)

Remember we’re just learning – 1 minute to think and 2 minutes to respond (think of many answers)

1. Name things that the sun shone on today – (32 responses)
   a. Techniques
      i. Piggyback – give example
      ii. Look around to get ideas
      iii. Short, Clarify or Repeat if response not clear to judge

2. Name things that are found in a basement – (51 responses)
3. Name things that Ms C might find in her lunch box. – (49 responses)

4. Ways to make things go – (43 responses)

11/01

Spontaneous

1. Be a part of the problem (the pumpkin candle) – (35 responses but answers too long)
   a. Talk to someone in it
   b. Be one of the characters and have them talk
   c. Talk about it

2. Things you don’t want to hear on an airplane – (35 responses)

3. You have just landed on Mars – what is this? (an object of some sort) – (45 responses)

To help the boys with ideas when stuck we asked for interests

• AC – building airplanes
• AS – model rockets, video games
• SL – Japanese comics, battlebots
• PF – Sports, Lacrosse
• Evan – Soccer, Music
• JP – Ski
• DW – cats, woodworking, computer
11/08

Spontaneous

1. Different ways to use a math book - aside from learning Math (44 responses)

2. Venice Picture
   a. Be a part of the problem (talk in it, about it, to it)
   b. Short answers (don’t try to be funny)
   c. When your turn is over – prepare for next turn (44 responses)

3. Plate holder
   a. What could you do with this?
   b. What could this be? (35 responses)

4. Name thing that are secret (46 responses)
   a. Some responses (deodorant, passwords, money)

11/15

Spontaneous

- Judges decision final – repeat, clarify, inappropriate

- Think about your “fall back” category (talk about how to use)

1. Verbal (1 min. to think, 2 minutes. To respond) your problem is to: give examples of something that follows something else. Ex. B follows A (21 responses) Boys were very creative, some piggybacking

2. Verbal - name something that hurts and to say what it is that it hurts. Ex: Bee stings hurt people (47 responses)
3. Hands-on (You will not get any more materials)!! ?? from one of the boys
- Do we need to use all the materials? Materials are a paper clip, circular cotton pad, piece of rectangular foil, and a pipe cleaner.
Problem: make something you can use to help you clean your room. Tell me: what it is called and how it works.
- PF - spins arounds, air freshener
- JP - key like car
- AS - games
- DW - scrubber ax - chop or push to the side
- SL - Templo spatial time saver - type in the coordinates
- AC - Sucker grip - wheels along
- Evan - Silver metal - Give to younger brother if he cleans the room.

Ideas involved bribery, escaping and tools

Some thought for this week:

1. After spontaneous, continue working on the scene - have them split up and draw another idea. Then share like we did last week. From there we could break up into 2 groups and brainstorm more scene ideas - then share those with full group. goal: get some interesting, varied ideas on the table

2. Next: 1 group goes back to working on the vehicles. Do any of the ideas on the scenes give them some new thoughts for the vehicles?
Other group starts thinking about the "presentation/play" - using some of the 
scene ideas that have been developed

3. Groups get back together & share thoughts

General stuff:

- Keep things structured like last week
- Tell them at the start of the meeting what our goals are for the day:
- *Group 1*. Come up with at least 7-10 additional ideas for the scene
- *Group 2*. Re-evaluate vehicle ideas in light of the scene ideas - start to get some themes
- Help them understand that a successful team comes up with a solution that is a merging of the ideas of all the teammates - the whole is greater than the sum of the parts!

11/19/02 – Half day so took the boys to the science museum. Some team type activities such as building an arch that took cooperation of all of us. At the end the boys built in the sand and water land and waterways and seem to start bonding as a group. Teamwork is being worked on weekly. Creating a safe environment where there are no wrong answers, anything goes is helping this effort.

11/22/02

Spontaneous – Hands on – Groups choose who would build, leave the room and write.

*Group 1* – E(left), AC(wrote), P(built); *Group 2* – S(left), D(wrote), J(built); Judge AS

Problem: Broke the group of seven into two groups of three with one child the judge.

Materials were given to each group in a bag. One person from each group left the room.

One person built an object using the materials while the other person wrote the steps. The object was covered. The other member returned and had the job of building the object from the instructions. The judge determined which groups second object most resembled the first.

This was a great learning experience on writing directions, following directions and keeping the object built simple. The judge tied the two groups. Activity gave insight into each of the boys’ strengths and weaknesses. One boy J just piled the materials making it difficult to write the instructions though D did a great job. It was difficult to duplicate this object, though the piles ended up looking about the same in size. The other group had similar features but realized that they need to be more specific about one dimension, two dimensions or three. They changed their design midstream but forgot to take out that particular instruction.

Brainstormed:
- What the vehicles would carry
- Different kinds of vehicles
- Before and after for the scene

By breaking the brainstorming into small parts the boys seemed to be able to come up with ideas that they then thought about for the scene. Made thinking about the scene easier. Brainstormed zoomed in features and then zoomed out features.
Watch some examples of past OM presentations to give the boys an idea of expectations for the presentation.
What is Dysgraphia?

Every child with dysgraphia is unique with varying degrees of symptoms. Many of the following symptoms excerpted from Regina Richards book, The Source for Dyslexia and Dysgraphia, seem to fit Evan.

Dysgraphia....
  • is a processing problem
  • causes writing fatigue
  • interferes with communication of ideas in writing
  • contributes to poor organization on the line and on the page

Dysgraphia can be seen in....
  • letter inconsistencies
  • mixture of upper/lowercase letters or print/cursive letters
  • irregular letter sizes and shapes
  • unfinished letters
  • struggle to use writing as a communication tool

Dysgraphia is not....
  • laziness
  • lack of trying
  • lack of caring
  • sloppy writing
  • general sloppiness
  • careless writing
  • visual-motor delay

Meeting Transcription 10/15/02

Participants: Cathy Bussey, Mrs. PC, KK, Mrs. K, Mrs. M

CB – Evan seems to be showing signs of dysgraphia where basically with his handwriting lower case a’s look like u’s. On his spelling he marked three of them wrong, which he spelled right because he wanted to do his sentences on them? “Evan you spelled these right” and Evan responded, “that he wanted to do sentences using those words.” Copying was something that was very difficult in first grade so he broke all his pencils, and faked asthma attacks. He was out of the room constantly, anytime there was writing. Second grade, she figured out that by filling in the blanks, Evan did much better, so she knew that Evan comprehended. Anytime it came to writing it was difficult. Third grade, it was world war III when writing the journals. That’s when Mr. C recommended a tutor, and that we go through the process of having Evan evaluated. Fourth grade, Evan’s teacher worked very hard on the writing, and we finally resorted to allowing Evan to do his spelling tests and any time tests in manuscript.

C – We do that anyway.

M – And that’s on his IEP.

CB – Just because he was making errors with the cursive. Eventually, down the line we may have to give him a computer, may have to give him typing especially in social studies, as the need arises for doing more notes. When that process happens. It’s a balancing act; I don’t want him not practicing his cursive; when we give him the tool (computer). How long we keep him writing before giving him the tool, so that it is more automatic needs to be determined. In math, the things I notice that he does the most is
that 0's becomes 6's and 6's become 0's. On the rice assignment he had difficulty copying from one square to the next. Tracking, left to right was difficult. He was dropping numbers or a 21 became a 4 when he copied it. That's where it became very obvious to me that he still has very much of a disability. It is better; it's much better than it was. We took him to the eye doctor. Last year at this time he was seeing a very narrow range and now he is seeing a much broader field. The eye doctor is saying now that Evan only needs the glasses for long focus work. He does not need them for shorter focus work. If he is going to be reading for 2 to 3 hours then he should be wearing them.

KK – Long focus even at near point?

CB – His eyes are much better than they were. Right now the glasses are lost so that is not helping at all.

C – Now he told me, and he told the other students, that he no longer needed glasses.

CB – She said he no longer needs them for short term type assignments.

C – He didn’t qualify it, he just said he no longer needs them. I asked him about it. He said, I don’t need them any more and don’t worry about them being lost.

CB – O. K. we’ll take care of that.

C. – You’re welcome.

CB – He may of purposely lost them. Basically, his eyes are better. He is reading books and he is tracking. Last year when he got the glasses, it was like magic, because he was able to read the Harry Potter books in five weeks, whereas before he couldn’t have scanned and done that.

C.- They have helped.
CB - The glasses have retrained his eyes and have helped tremendously. We will get them because she wants him still wearing the glasses as needed.

C - O.K. so we will be on the lookout for them.

CB - I have a sheet here where I have typed up what dysgraphia is. These things seem to fit Evan to a T. It's not dyslexia per se, it can be part of dyslexia. He learned to read perfectly fine, so if he has a mild form of dyslexia it hasn't seem to affected his reading. His phonics still seems to be an issue. It is better, I see improvement all the time with the spelling.

KK - His comprehension is good too for the most part.

CB - Yes, he has very good comprehension. I wrote this up so that you can read through it because it seems to fit him to a T. I read it to my husband who would have liked being here but he is out of town. He said, oh that sounds just like Evan.

KK - Without even looking at this I think that we can all agree, that most times you can not read what he has written. And the sad part is....

CB - Is that he can't read it. Studying for the social studies test. I looked at the social studies notes and I gave up even trying to quiz him because I couldn't read his handwriting. So the grade he got, he got all by himself from memory. I don't even think he could read his handwriting.

M - Do you, sometimes in the past, I still have the kids taking the notes for social studies.

CB - I still want him taking the notes, for the practice.

M - Do you want to have a hard copy, to send home so that you have what he really should have to compare. I have done it in the pass for some students.

CB - That would help tremendously for me to help him to get his handwriting better.
M - O.K.

CB - Also it would help me to have him study. I just looked at his notes. He read them he study some and most of it was...

M.- Didn’t he get in the 80’s, 84, 83.

CB -- He probably could have gotten in the nineties very easily

M - if he had studied

CB - if he had had an easier time studying his own notes.

M - Right.

CB - He can go slow and he can make it legible but it takes a lot of effort. It takes double the time to do what other students that can do quickly at this point. Anytime he is in a hurry, it is not automatic. He has to think almost how to form his letters still.

C - I saw him looking up there (cursive on the wall)

CB - Especially for the cursive. He has to. It is not there.

C - He is not the only one. A number of them still do.

KK - I still believe that if we can get it to a level that it will be an efficient tool for him, that keyboarding could be the answer for him.

CB - Keyboarding is definitely an answer for him, and he is going to need that tool but

M - How is he doing with it....

CB - Not very well. I have been reading up on it. It is part of the dysgraphia not being able to learn to keyboard in the traditional way. If you read his IEP, he can make sense with nonsense words, but home row typing starts with nonsense words. That doesn’t make sense. There is another program out there, but I don’t think we need to buy the program, but basically, having him do ere, do the phonic patterns, real words is more the
way to get him keyboarding. Give him actual paragraphs, but then you have to watch him because he uses the wrong fingers.

KK - Yes it is

CB - We tried color coding and color coding his fingers. I can try that again and see if we can get that to work so that we can finally get him to do it. He is very slow at it still, so it is going to take a process. In a way it is almost to our advantage because it forces him to have to do more of the writing, which we want to be more automatic so that he can read his own.

KK - I don't know, I don't know if I agree with you. I have read too many studies where it says that children that have trouble with fine motor, handwriting, that in today's society that keyboarding is going to be the answer and even for note taking. Maybe, even by the time that he is in high school, he will have a little laptop, and he will not have to worry at all about forming letters. By then hopefully it will be more automatic.

CB - The fine motor control is there but I forgot to bring his drawings. His drawings are so detailed, and it is obvious so that when he is drawing is totally different than having to remember to do the circles on his letters. It is not transferring. A lot of dysgraphia kids can draw and they can't do their letters. It is something with the visual, and I don't know what it is. I think we almost have to interview Evan, and see if we can get him to tell us where the problem is. The spaces between the lines, he can't put the letters between the two lines. You sent home the cursive packet, his letters are all over. It's like he doesn't see those lines, but then when he draws it is all there.

KK - With Keyboarding he doesn't have to worry about lines or spaces.

CB - Right so
KK. – He needs to practice and more than the twice a week that he goes with Pat. At home, ideally 15-20 minutes a night.

CB. - I downloaded a thirty day sample of inspiration. He loves that. He crashed my computer. He was all over there. Basically open it up. He went in, he was in places that I didn’t even know existed. He made three webs, one with the people on OM, another with animals, which was good for his spelling but also good for his typing. So I will probably put him in there because he was having such a great time playing.

KK. – But how is he typing?

CB. - I am watching him. I am sitting right there watching him.

KK. – Is he using the right fingers?

CB. - No, that’s why I am sitting right there. I might put something on the keyboard to make sure he is color coding and using the correct fingers. We try that but it didn’t work. It is almost like he is not quite ready.

KK. – Could be.

CB - We’ll have to keep working on that. So basically I am looking for you to be my eyes in the classroom, to give me information and feedback about him in the classroom. I want to take this year and try to put him from the at-risk. I mean he is at risk. I have seen kids like this when I was teaching my ninth graders last year and I don’t want him to be one of them when he hits ninth grade. I am not worry about his grades. I want him to do better and better, but right now I am more worry about getting those things that are not allowing him to get the grades, taken care of, and focusing in on that, more than anything else. He is a smart little boy, there is no doubt in my mind. Now, we have to figure out
how we are going to let that smart come out. I don’t know if you have seen any of his inspirations? He might not still be talking in your room.

C – I get some out of him. Mainly, I want him to get more of his affective out for me. I wanted him to show me... I want to have some personal connection with him. That is one way as a teacher that you get to work with a child, make a connection.

CB – He loves the computer.

C – I don’t see that.

CB – At home, I can’t ...

C – I don’t see it in school. I see him avoid anything he finds frustrating. And I don’t blame him. He really just doesn’t gravitate as other kids would as other kids do. I want him to do that. But right now I am not seeing that.

CB – At home he is doing it ...

C – Oh, good, I am glad to hear that. My biggest thing is pulling him off the computer to do his homework.

C – Well good.

CB – He is also into the games.

C – Well we’re not doing games

M – We don’t do games too much.

C. – Well that is a whole different story.

CB. – Well you might be able to grab him with inspiration. I don’t know if you have inspiration...

C – I have been grabbing him with reading.

CB – He loves books.
C - I have been grabbing him with that. And he likes to with a little bit of nudging telling about books and discussing. It's difficult but we are getting there. But I didn't expect it to be an overnight success.

CB - He is not an easy one. He does not open up to adults very fast. You probably realized that when you started working with him (directed to KK). He is probably better now.

C - I see a smile every once in a while.

KK - He's better. And I tell you he is a lot better now that he is not with Jacob. He and Jacob last year always came together and it just wasn't a real good mix. It was kind of like how can we get out of whatever it is that she wants us to do. And now he is with kids, that are more in tuned with being successful academically and I see him much more the student in my room. So I am pleased with that behavior.

CB - That's good.

C - He did have a job of putting the schedule on the board every week, everyday. And he had to write it. He wasn't real enthused about it first of all, and I had to remind him everyday to do it. But I thought it was good for him to get up there and do it.

CB.- And that week I knew exactly what his homework was. I haven't seen him write anything down since. Nothing is on his homework sheet or very little.

C - Then I am going to have to check him.

CB. - Nothing is on that sheet.

C - That is not for lack of trying. I am there and I tell them every afternoon and we go over it. He seems to be writing. I guess he isn't.
CB – There is a little bit but not everything. The other thing is that his spelling words do not come home on Mondays.

C – They should.

CB – So it is Wednesday, and we are trying to get the spelling words.

C. – Well he takes spelling with Mrs. Kostner.

CB. – Or he is coming up with his list from memory. It is not going into his docket so I don’t have the words.

KK – We give him the pre-test and highlight the words that he has to do.

CB – If I have the pre-test in there then I don’t have the list to figure out his words.

C – Well he should have both of them.

CB – They are not in the docket. They are not coming home.

C. – Well they have to go in the docket right away.

CB. – Organization seems to be big.

C. – Its a big problem.

KK – Sometimes I am thinking, I am just trying to visualize, that I see those papers going in, maybe they are just not going in the right spot.

CB. – That’s not a problem. I go through his docket and we resort.

KK. – You go through the whole thing.

CB. – We resort. If we could get him to take the papers out of his desk and put it in the back of the docket we will take care of it and make him sort them and keep it organized. His desk is a mess every week. His spelling words are in there right now. He does a lot from memory. One week he came up with his whole spelling list by memory, because he didn’t bring it home. So we pre-tested and figure out which words he didn’t know and he
wrote his sentences using those words. Have you notice that sometimes he will spell one word right one day and wrong the next.

KK – Oh sure, all the time.

CB. – That’s another part of the dysgraphia.

KK -- He sometimes has short term cabability but then it is not placed into long term therefore he can’t use it in his writing.

C – So basically, what you would like us to do is to keep track of a number of these....

Mrs. Mayer already said that she will give you a hard copy of the social studies notes so that will help with the social studies...

M – And some units are different than others. The immigration unit had a lot with the note taking. The next unit is government, that has many notes. But the other thing we are getting ready for is the New York State Social studies test which is in mid November, where they have to write an essay, where they have to analysis documents. Take all that information, from the analyzing and put it into an essay. Mrs. Kostner is working on that with Evan.

KK. – with the boys.

M – Then there will be review questions with a multiple choice piece and then more analyzing of documents and a lot of writing on that test. So those are the two things that we are going to be working on. From really what I see with Evan in class. I see him 4 times a week at the end of the day is not an ideal time to teach a class or any class last period but that is how Pat’s schedule and mine worked out. He comes in very, very quiet in class. Very quiet. Well behaved, listening, sits there but one of my goals is to have him participate more in class. And like you said, is a very smart boy and I think he has a lot of
ideas, a lot of knowledge up there and I want him to share his thoughts and ideas with the rest of the group. At this point I haven’t seen anything of that. So that is what I would like to see more of.

CB – Part of that may be that he is number four, and has never got in a word edge wise with his three sisters. I mean I have to literally shut his sisters up when he is trying to talk. I don’t know if it birth order here.

C.- Whatever it is we have to encourage him to participate.

CB – Yes, definitely

M – We do a lot of discussions in social studies and relating things. That part I would like to see him take a more active role. But I can definitely provide you with a copy of the notes as we are getting towards the end of the unit and go from there.

C.- In math, how is he doing in math?

K – He is doing very well in math. His test score was over 100. Wasn’t his test score a 101. So he scored very very well. He seems to enjoy it. He doesn’t really participate. He will answer if called on but he is not one to raise his hand. He does well. As far as the handwriting, yes it is difficult to read. If I, you can see and go back to the problem does he mean a six or does he mean a zero.

CB – In long multiplication, when he goes to add, he might flop the zero or six to the other one. I notice this all the time on long multiplication, the zero will become a six when he brings it down.

K -- Oh, O.K.

CB.- It is interfering with his accuracy. It is not a conceptual understanding. It is more getting...
K - Now, when he does his test Friday on three digit multiplication would it help him, I have a lot of students that have been asking, about graph paper.

CB - No, not at this point. He has been doing so much that he probably does not need it at this point.

K - Would he choose to use it if it was available.

CB - No, I don’t think so at this point. Last year he was using it, but I think that at this point he is probably O.K with three digit. His problem is more that he is going to flop seven’s to two’s. Basically, telling him to be careful with his handwriting before he starts.

K - It will be interesting because the last test we took, there was not a lot of math computation. The place value was more processes. He has done well on the homework but the homework is home. He can ask questions if he needs it.

CB. - Well, I go through his homework to make sure that any of the handwriting errors he has made, he corrects. So you are not seeing those. You might see them on the test.

Remind him to be careful, he might score higher.

K - O.K.

KK - Can he do that then?

CB - Oh, he can do that. He can focus in hard and he can do it on tests. He can do really a lot better.

K - O.K.

CB - He has to be reminded to put his capitals and his periods, and his handwriting.

C - I know that he some children are shy and that some children are or will just sit there because they don’t want to. I think that as a parent it is good to reinforce what we just said today. I think you have heard from all of us that the participation piece just isn’t
there. And if you can encourage him, tell him that *that is a great deal*. It is part and parcel of a grade, that is number one. But more than that when a child has a bank of knowledge, the connections. I like the connections in literature. If he could, and I know that he has *read*, if he could share some of that with the other children that would be just for himself. He is going to feel better about himself and it also helps other children. So, if you can encourage him to participate in class, *I think* that piece, would be a very helpful piece.

CB – I will try my best. He is a very shy, not wanting to put himself out in front of the other kids.

C – Gentle persuasion might help. And I think if he hears it from more than one place it might become part of him. But more and more it is a piece that needs to be there. And you are not going to get *through* by sitting. It is to his disadvantage and the rest of the students’ disadvantage. If you have read a number of books and you can make a connection among the books, or you can add something to *the discussion*. Makes it glorious, makes a wonderful, colorful quilt. If you do not you are just sitting there absorbing or I don’t know where you are. I really don’t know where you are. I mean a child *sitting* looking, I don’t take that they are with me all the time. They could just be thinking that, I wish that she would just keep quiet...

M – How many more minutes until I can *get out of* social studies class.

CB.- He’s funny. He’s a lot like his older sister. With her I went to her best friend’s mother to know what was going on. She was quiet too. He is very similar to her, and just trying to get the information out of him is very very difficult. It seems to be almost genetic.

C.- I just want to...
CB – It can get better, and it will get better
C – Good, I know that it can.
CB – We just have to work on it.
C – O.K. And the glasses are to be worn for?
CB. Just real long focus. With how short the periods are I don’t know if he really needs the glasses.
M – Do we need to worry about him seeing in school?
CB – I don’t think you have to worry, at this point. If you see that he is covering one eye to read, then his eyes need to be retrained.
C – O.K. We just have to find the glasses.
CB.- If we had had the glasses for the copying from box to box on the rice problem, he could have done it a lot better.
C – Have you’ve seen the glasses at all.
K – No I haven’t
C – Patsy
M – No, I haven’t
C – But I haven’t seen them in a while. He has a nice little case, he takes them out, puts them on and it is brief like when I remind him. Then like the other day he told me that he doesn’t need them anymore.
CB – It is a real annoyance. He has 20/20 vision. So the glasses are a real annoyance, especially if he has to look at an overhead and down. He can’t. He has perfect vision and he (wore his glasses on the tip of his nose) to do it. He needed the glasses to copy but could not read the overhead with them on.
KK – You said long focus. What period of time are you talking about? A half hour?

CB – We almost have to go to Evan at this point since his eyes have gotten so much better.

KK – The glasses actually trained the eyes?

CB – They trained his eyes. His eyes, he went from this narrow vision to now it is more open, seeing more in the field. It may be part of why we saw so much trouble with the handwriting. He seems to be reading normal, not covering one or the other eye. He does have some astigmatism that is starting to kick in now but she is not correcting for it yet.

C – So the take away from this, is the glasses for a long focus activity. We have to find them and encourage him.

CB – Or when you see him having difficulty, like with the copying where he has to track.

C – And we would also like him to participate more. So all of us should try to encourage him. Social studies notes going home.

CB – The keyboarding.

C – The keyboarding.

CB – So we will keep working on that.

C – Anything unusual or unique we will just report back to you, or you report back to us. If you see something that is helpful at home, and we’re not doing it, and on the same token we will do the same.

CB – That would be great. I would like to take this year because I have the time right now. I won’t have it next year if I am back in the classroom.

C – O.K.

M – Does he know that you are doing the thesis on him. How does he feel about that?
CB – I’m not sure. It is almost like he is getting too much of mom’s attention. I’m not sure. He is proud of his drawings and proud of what I am saving. So in some respects he is proud that I am paying that kind of attention. I’m not sure.

M – right

CB – I will find it very interesting with the Odyssey of the Mind to see how he is acting in the smaller group. How he interacts with just seven boys instead of a whole room.

K – That will be great for him.

C – O.K. Well, I thank you for coming in. We will take these to heart. Hopefully, we will have some progress this year.

CB – Well I hope so.

C – Well we will encourage him.

CB – Thank you.
Notes from Parent, Student, Teacher conference on 11-08-02

Evan’s goals are to raise B’s to A’s and C’s to B’s on report card.

PC-something permeates whole report card.

E – work neatly

PC – what specific

E – no answer

PC - participate in class. You are engaged but we need to hear from you. A little selfness not sharing. Every teacher would like to see more participation. Key piece in reading.

Pencil and paper doesn’t always do it. Want to be dazzled by your literacy connection.

Studying and participation key to bringing up grade. What is your best subject.

E – Math

PC – Your favorite. Are you studying your spelling words every night? Misspelling when doing sentences. Careless don’t really care. Want to see effort in spelling. Are you studying all the time for the tests. Do you tell parents you studying for tests.

Communication is key. Your responsibility to be a good study. Study habits here hold him for Middle School and High School. Gives very little of himself. Just like OM. Tell us what you know. Read some very good books.

Evan will go to Mrs. R for state social studies exam to use computers for the writing.

Practicing DBQ with Mrs. KK. First day is multiple choice. Second day is writing. Needs to scaffold using four to five documents. Draw information from site documents in essay.

Study strategies – look for words in document.

Goals for Evan
• Study for tests
• Fill in homework sheet
• Fill in monthly calendar
• Class participation
• Keep desk neat and loose papers in docket

H – Fun to cross off but fun to get good grades on test.

PC – Expect you to keep desk clean. Do take time to put paper in docket. Evan what do you need to do?

E –
• Write down homework
• Study for tests -- chunk it each night
• Participate
• Papers home to parents
• Desk -- no papers
• Papers in docket – desk neat.

PC – How computer skills? Keyboarding skills will help

Me – Practice using patterns

PC – Ultra Keys is the keyboarding program and it does that. Evan what are your responsibilities at home

E –
• set table
• take out recycling

PC – What do you like to do?
E -
  - legos
  - read
  - chess

PC. - Who are your best friends

E -
  - CT
  - AU
  - TL
  - RB

PC. - Next book reports are

  - Pleasure
  - Newbury Honor
  - Historical Fiction
    - Devil's Arithmetic
Meeting with WP Interviewing techniques

10/21/02 meeting with WP to discuss Interview Questions for the Teachers

Think about percent time copying from the board, percent of time taking notes, and percent of time to read and take notes.

Why do you think that he is not participating in class?

Is there a lot of writing in your class?

How much do you know about dysgraphia?

Do you know what dysgraphia is? At this point use the star simulation activity.

Dysgraphia is not something you can see. It is hard to understand that it even exists.

What role does technology play in your classroom?

What technology are you using in your classroom for yourself and with the students?

Can you picture a place for the Tablet PC in your classroom?

Link the Tablet PC back to Evan’s list of challenges.

In your class what are the various types of writing activities?

I will adapt materials to the Tablet PC before it is being used in the classroom.

What are Evan’s challenges? Goal is for Evan to become an independent lifelong learner. Will the Tablet PC allow him to accurately take and read his own notes? Will this eliminate the necessity of future scribe or teacher’s notes to be given to Evan in social studies?

Why doesn’t Evan participate more in your class? This question is not reflective on you but on Evan’s type of disability and the years of baggage that he is carrying to your class. How can we together get Evan to start unpacking some of this baggage to get him to participate more?

What is typical 10-year-old boy stuff versus behaviors due to his disability? How are we going to separate the two?

When Evan is uncomfortable in new situations he sometimes is passive resistant? How can we change this behavior in Evan?
When Evan becomes comfortable will the passive resistant behavior disappear?

What secondary, problematic things are you seeing in the classroom? In other words does Evan come prepared? Does he forget his pencils and materials?

Want a general neutral survey. Want to break defenses down a little bit.

How do you view children with disabilities?

Many children with dysgraphic disabilities have similarities to Evan.
Star simulation drawing activity instructions

(Richards 1999)

1. Draw the star within the boundaries by only looking in the mirror.

2. Place the mirror perpendicular to the photocopy so you can only see your dominant hand and pencil in the mirror.

3. Have another person hold a piece of paper over your hand and pencil.

4. Draw the star looking in the mirror staying within the boundaries.
Star Simulation Activity

Simulation 1
Sample Figures for Diagnosing Dysgraphia

Sample Figures

Examples

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Copyright © 1999 LanguageSystems, Inc.
Sampling of Evan's Work
Bottom View

58 helicopter hooks

Side view
12-17) Complete the Order Form. Then, in the bottom box, calculate the total amount of the order.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
<th>Quantity</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shirt</td>
<td>$14.36</td>
<td>6</td>
<td>$86.16</td>
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<tr>
<td>Sneakers</td>
<td>$45.97</td>
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<td>16</td>
<td>$23.20</td>
</tr>
<tr>
<td>Hat</td>
<td>$8.64</td>
<td>4</td>
<td>$34.56</td>
</tr>
</tbody>
</table>

**Compute:**

1. \( \frac{12 \times 5}{6} = 20 \)
2. \( \frac{48 \times 4}{16} = 12 \)
3. \( \frac{82 \times 6}{12} = 41 \)
4. \( \frac{95 \times 8}{16} = 47 \)
5. \( \frac{48 \times 6}{24} = 12 \)
6. \( \frac{52 \times 7}{70} = \frac{364}{70} \)

\( \frac{72}{3} \times \frac{5}{16} = 225 \)

\( \frac{326}{7} \times \frac{4}{2} = 117 \)

\( \frac{48}{4} \times \frac{86}{2} = 1600 \)

\( \frac{912}{20} \times \frac{20}{4} = 2240 \)

\( \frac{527 \times 7}{70} = \frac{3699}{70} \)
Peter Piper picks peppers.
Peter Piper picks peppers.
Mary Mary quite contrary
Mary Mary quite contrary