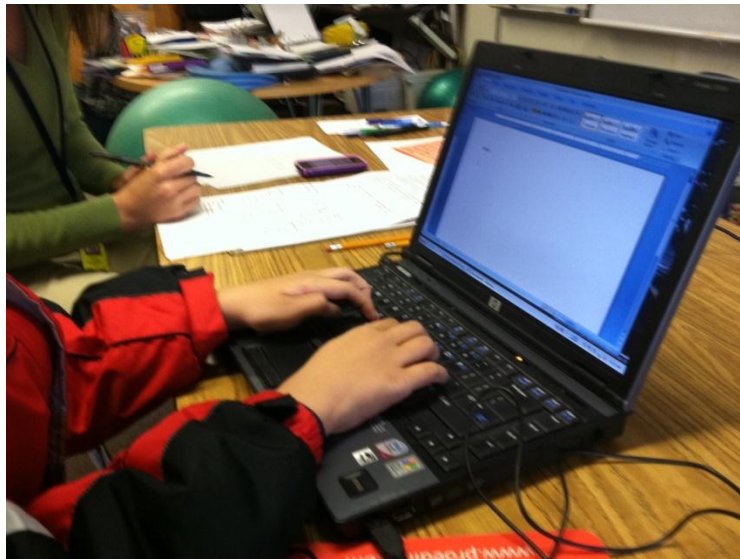


**BVSD ASSISTIVE TECHNOLOGY
WRITING EVALUATION:**

An Interdisciplinary Approach



©2011 BVSD ASSISTIVE TECHNOLOGY TEAM:

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Table of Contents

Introduction	3
The referral process	3
I. Data gathering.....	4
A. Records review, background information	4
B. Interview with school team, family, and student	4
C. Protocol Task 1: Handwriting copy	5
D. Protocol Task 2: Handwriting to dictation	7
E. Protocol Task 3: Typing to dictation	9
F. Optional protocol tasks.....	11
G. “The Question”	11
II. The “AT Toolbox”	11
III. Feature matching	14
IV. Final stages: Presenting results, discussing action plan, subsequent follow-up	18
Bibliography and sources	19
Appendix	20
A. AT Writing Assessment Protocol.....	21
B. Grade level “No Excuse” sentences	25
C. Graphic organizer resources	27
D. Speech recognition—a discussion	29
E. Text-to-speech resources.....	31
F. Typing tutorial resources	32
G. Spellcheckers—a discussion	33

INTRODUCTION

The Colorado Department of Education’s school-based SWAAAC teams (Statewide Assistive Technology, Augmentative and Alternative Communication teams) provide multidisciplinary assistive technology services in school districts around the state to enable students with disabilities to have equal access to the curriculum and full participation in their education and classroom. The Boulder Valley School District’s SWAAAC team is known as the “Assistive Technology Team” (or AT Team) and consists of an occupational therapist, a special education teacher, and a speech/language pathologist, all with special training in the use of assistive technology and communication systems/devices. The goal of the Assistive Technology Team is to provide resources and the student/staff training necessary so that students with disabilities can participate in appropriate educational experiences and communicate what they know.

Our BVSD AT Team has been conducting assessments for students with writing difficulties since the team was formed in 1993, and over the past six years we have organized and formalized our procedures. The original AT Writing Evaluation Protocol was formulated by team members Anja Kintsch, Rosemary Bogart, and Paul Visvader and it has evolved to its present form through the efforts of the current team members: Jennifer Leonesio, Erika Brandstatter, and Paul Visvader (Anja and Rosemary are no longer with the team).

The AT Writing Evaluation process is typically initiated by the school team or family who might be wondering whether any type of technology exists that would be of some benefit to their student. Alternatively, they may have heard of some type of technology that they feel might be an excellent “fit.” Or, they may want to brainstorm possibilities for various writing accommodations. In any of these cases, our Writing Evaluation procedure can provide quantitative data and a solid evidence-based rationale for various assistive technology strategies, and it may be able to uncover some additional possibilities that may not be immediately evident.

Our Writing Evaluation procedure can be broken down into several steps: the referral process, data gathering, drawing from resources in the “AT Toolbox,” feature matching, generating recommendations and a report with an action plan, and finally, follow-up and training, as needed. Each of these steps will be considered in greater detail in this book. Once the student has been evaluated and assistive technology strategies have been put into place, the student becomes part of our AT Team caseload and will be followed from grade to grade and school to school until s/he graduates from the system or else s/he no longer needs our services.

THE REFERRAL PROCESS

When the school team and/or the student’s family has decided to initiate the AT Writing Evaluation process, a standardized referral form is filled out with information pertaining to the student’s learning style (writing, reading, math, study skills), computer skills, communication abilities, and physical access. There is a section for the family to indicate what their concerns might be—this is especially important to insure that everyone is “on the same page” as far as perceptions regarding the student’s strengths and challenges, as well as expectations for conducting the AT Writing Evaluation. Signatures are obtained from all team members and the family, and the referral form is sent, together with a copy of the most recent IEP (and any school-based or private evaluation reports that may shed light on “the issues”) to our team so that we can schedule an appropriate time for the evaluation to take place.

DATA GATHERING: RECORDS REVIEW, BACKGROUND INFORMATION

After the referral form and IEP materials have been obtained and the evaluation has been scheduled, the AT Team case manager for the student's school reviews all of the materials carefully and begins to piece together a rough strategy for conducting the evaluation. A number of questions and issues need to be addressed before the evaluation takes place. How is the student currently functioning with respect to written language output? Is s/he making use of a scribe? Is the student old enough for keyboarding? (Typically keyboarding is not taught in BVSD until the 3rd or 4th grade) What type of learning style does the student seem to present with according to the paperwork? What are his/her strengths and challenges? Are there any technologies (software or hardware) that we should bring to the evaluation to either demonstrate to the team and family or try out with the student?

In addition to the obtained paperwork, our AT Team speech-language pathologist and occupational therapist will contact the school team's SLP and OT to gather any pertinent information, impressions, suggestions, and recommendations ahead of time in order to gain a more accurate picture of what to expect. Paperwork descriptions, while accurate and representative in the majority of cases, may sometimes be misleading.

DATA GATHERING: INTERVIEWS

Our writing evaluations can take anywhere from approximately 1-2 hours and they usually begin with a short conference with the school team and family—perhaps a half hour to 45 minutes. Our team explains who we are and what we do, gives details about the evaluation process, report writing, and follow-up, and then discusses the issues in more detail from everyone's perspectives. How is the student doing in school? Is s/he functioning at grade level or substantially below? How much help is s/he receiving? What types of accommodations have proven useful? Have any assistive technology strategies been tried as yet, and if so, have they proven to be beneficial? Has the student "bought into" any of these strategies or is s/he resistant? What types of strategies have been tried at home, and have they proven useful?

We will also examine any writing and/or typing samples the teacher or paraeducator may have and judge them on length, organization, word usage, penmanship (or typing accuracy), spelling, and fulfillment of the assignment. If the sample is a final draft, we try to get a sense for how much help the student had during various stages of the process: brainstorming, organization, composition, spelling and mechanics (capitalization and punctuation), editing and revision, etc.

At this point we call for the student to come and join us and we typically converse for several minutes to "break the ice" and establish a working rapport. During the conversation we introduce ourselves and describe to the student who we are and what we do, then gradually elicit his/her own perspectives on personal strengths and challenges, and find out what types of things s/he enjoys doing (and doesn't enjoy doing). We then describe the specific tasks involved with the Writing Evaluation and stress that it is not "for a grade," but that it is important to try hard anyway since it is all about trying to alleviate writing difficulties and "making life easier."

DATA GATHERING: PROTOCOL TASK 1—HANDWRITING FROM COPY

Our first task is “Writing from Copy” and for this we use an Optometry test (used by many Occupational Therapists) called the “WOLD” (©2001 Optometric Extension Program Foundation, Inc.). This test is very short (less than 3.5 minutes) and requires the student to hand copy a 32-word sentence from a typed model at the top of the page to a wide-ruled section at the bottom of the page. We tell the student to copy the sentence using either printing or cursive (whichever is most comfortable) “as quickly and as neatly as you can.” The test is timed and the handwriting speed is normed in letters-per-minute according to grade level ability (although the norms for this test are somewhat old, they correlate well with most newer studies). We also calculate words-per-minute to be able to compare speeds with the other tasks in our writing evaluation.

The WOLD sentence that the student copies is grammatically correct; however, the subject matter is “fanciful” and it would be difficult for the student to memorize or “chunk” portions of the passage as a strategy to speed up copying performance. For this reason, the WOLD is a relatively pure sentence copying task with few, if any, confounding variables. In addition to the normed handwriting speed we can informally assess copying accuracy, fine motor precision, penmanship and legibility, concentration and focus, posture, visual tracking, visual motor abilities, pencil grasp, and physical tone or tension.

In order to illustrate more concretely the different sections of our Writing Evaluation Protocol¹, it will be useful to consider a specific example—a student we will call “Cathy” (this student’s name and profile are changed slightly to maintain confidentiality). Cathy is a sixth grade student who is extremely dyslexic and receives special education services under a “Specific Learning Disability” designation. The school team referred her for an AT Writing Evaluation in hopes of improving her written communication skills. On the WOLD, Cathy was able to copy the sentence in 2 minutes and 15 seconds (2:15). We can convert the number of seconds to a decimal-based part of a minute easily by using the chart in the second box on the protocol marked 5 secs= .08 mins. Looking at the little chart, we can see that 15 seconds is .25 of a minute, so therefore Cathy took 2.25 minutes to copy the whole sentence. Since the sentence is 29 words (or 110 letters) and she copied the whole passage, we can easily set up the following proportions to find her words-per-minute (let x = words per minute), and letters-per-minute (let y = letters per minute):

$$\frac{\text{copying time}}{\text{total words copied}} = \frac{1}{x}$$

$$\frac{2.25}{29} = \frac{1}{x}$$

$$2.25x = 29$$

$$x = 12.9 \text{ words per minute}$$

¹ A blank copy of the protocol is included in the Appendix to this book, pages 21-24.

$$\frac{\text{copying time}}{\text{total letters copied}} = \frac{1}{y}$$

$$\frac{2.25}{110} = \frac{1}{y}$$

$$2.25y = 110$$

$$y = 48.9 \text{ letters per minute}$$

Cathy copied the sentence at 12.9 words per minute (which corresponds to 48.9 letters per minute—a 4th grade level according to the WOLD norms) with 100% accuracy, good attention and focus, legible penmanship,² and a left handed mature tripod grasp. Here is how we would fill out the first page of the protocol for Cathy.

WOLD Sentence Copying Test (©2001 Optometric Extension Program Foundation, Inc.). — Utilized to determine if the child has the ability to rapidly and accurately copy a sentence from the top to the bottom of a page. A necessary skill to keep up with classmates.

# of words (29 if no omissions): 29 Time: 2:15 (2.25 minutes) WPM: 12.9 # of letters (110 if no omissions): 110 LPM: 48.9	5 secs = .08 mins 10 = .17 15 = .25 20 = .33 25 = .42 30 = .5 35 = .5 40 = .67 45 = .75 50 = .83 55 = .92	Grade equiv:	WPM (words per minute)	LPM (letters per minute)
		2	7.9-10.5	30-40
		3	10.5-11.1	40-42
		4	12.1-13.2	46-50
		5	13.3-15.8	50.5-60
		6	14.4-17.7	54.5-67
		7	15.6-19.5	59-74
		8	16.6-21.1	63-80
Legibility Rating: 1) Almost completely illegible 2) Parts illegible 3) Difficult to read but decipherable with context 4) Legible (although not necessarily neat)	Rater 1: 4 Rater 2: 4 Rater 3: 4 Average: 4	Mechanics Observation: <input checked="" type="checkbox"/> Full punctuation <input type="checkbox"/> Partial <input type="checkbox"/> None <input checked="" type="checkbox"/> Full capitalization <input type="checkbox"/> Partial <input type="checkbox"/> None	Copying Text (fixations) Observation: <input type="checkbox"/> Letter by letter <input checked="" type="checkbox"/> Word by word <input type="checkbox"/> Phrase by phrase	

Considerations:

- Spacing and Letter Formation: *good*
- Posture: *good. Grasp—left handed mature tripod*
- Vocalization or Subvocalization: *none noted*
- Concentration, Attention and Fatigue: *good focus and concentration*
- Frustration level: *none*

² This is determined based on an average of our three team members’ penmanship legibility ratings on a scale from 1 to 4—from “almost completely illegible” through “legible, although not necessarily neat.”

DATA GATHERING: PROTOCOL TASK 2—HANDWRITING FROM DICTATION

Our second task is Writing from Dictation. This is a timed task that simulates note-taking in class by requiring the student to handwrite a short passage that is read aloud. Although technically this is a fine motor task, it also provides information on auditory processing, language processing, spelling and knowledge of writing conventions, sustained attention, and working memory.

The dictated target passages we use were developed by our team and formulated to include as many grade-level “No Excuse” spelling words as possible.³ Within each grade level, there are several passages to choose from, based on student ability. For example, if we were evaluating a fifth grader who was only able to copy 8 words per minute on the WOLD, we would most likely dictate only the first sentence of the 5th grade passage (17 total words instead of 32). Whereas, a high school student who is able to copy 15 words per minute on the WOLD would surely be able to get through the entire writing passage (or all 32 words).

To return to our student Cathy, the first thing we look at is the amount of words per minute she can write from dictation. On the WOLD task, she was able to copy 12.9 words per minute so we assumed that she could handle our longest passage, 43 total words. Cathy was able to write the 43 words in 4:10 (4.17 minutes) which corresponds to 10.3 words per minute. (We use the same proportion-based formula to calculate this as we did on the WOLD)

The next thing we examine is spelling accuracy. No Excuse word lists are available for only grades 1-5. If a student is in grade 1-5, we simply tally up the total number of No Excuse words s/he spells correctly and compare it to the total number of No Excuse words in the whole passage and come up with a percentage correct. For example, if there are 10 No Excuse words in the passage and s/he spells 5 of them correctly, our percentage would be 5 divided by 10 or 50% correct (.50 = 50%). However, if we are evaluating a student in grades 6-12, we dictate an appropriate length 5th grade passage, but score the spelling on the total number of words in the passage rather than just the grade-level No Excuse spelling words. Because Cathy is in 6th grade and there are no No Excuse words above the 5th grade, we based the spelling accuracy measure on total words (43) rather than the number of No Excuse words (14). In this case, Cathy spelled 15 of the 43 words correctly, giving her a spelling accuracy of 15 divided by 43 which works out to be 35% correct.

An additional spelling rating is included at the bottom of the page: our team uses Richard Gentry’s Developmental Spelling Rating Scale⁴ to assess the level of the student’s spelling skills and the patterns of his/her misspellings. Although in the 6th grade, Cathy was still developmentally between a phonetic and a transitional spelling stage. This can be very useful information for the teacher to have, and can also play a role in determining whether the student could benefit from spellchecking software, or whether word prediction might be more appropriate.

Another important consideration is legibility—as with the WOLD, our three team members examine the handwriting sample and assign a score from 4 down to 1 (4 is legible, although not necessarily neat, and 1 is almost completely illegible). These scores are then averaged to derive an overall team rating. Sometimes it is difficult to separate out legibility from “comprehensibility” or “intelligibility” if the student’s spelling is

³ A copy of the sentences we use is included in the Appendix on page 25.

⁴ See Dr. Gentry’s website at: <http://jrichardgentry.com/>

significantly impacted and the handwritten words bear little resemblance to the target words. However, this particular measure examines fine motor skill and precision: Are the letters themselves recognizable? How is the letter and word spacing? Do the words float above or below the ruled lines of the paper?

The next box on the protocol is the reader’s observation of the student’s auditory processing and working memory—how quickly and efficiently can the student write from the dictated text? Is the student able to listen to, process, and write the passage phrase by phrase, a few words at a time, or word by word? (Or does s/he need repetition of each word or phrase?) Cathy wrote phrase-by-phrase.

The next box is an assessment of the student’s use of writing mechanics—are the appropriate words capitalized and is punctuation present or absent? Cathy had full capitalization and only partial punctuation.

Here is how we would fill out the second page of our protocol for Cathy:

Writing from Dictation

Sentence # used: #5.5

<p>Total # of Words in sentence: 43</p> <p>Time: 4:10 (4.17 minutes)</p> <p>Words Per Minute: 10.3</p>		<p>5 seconds = .08 minutes</p> <p>10 = .17</p> <p>15 = .25</p> <p>20 = .33</p> <p>25 = .42</p> <p>30 = .5</p> <p>35 = .5</p> <p>40 = .67</p> <p>45 = .75</p> <p>50 = .83</p> <p>55 = .92</p>	<p>Spelling:</p> <p>Grade Level (K-5) _____</p> <p>'No Excuse' Words _____</p> <p>% spelled correctly: _____</p> <p>Total # of words (grades 6-12) <u>43</u></p> <p>% spelled correctly: 35%</p>
<p>Handwriting Legibility Rating:</p> <p>1) Almost completely illegible</p> <p>2) Parts illegible</p> <p>3) Difficult to read but decipherable with context</p> <p>4) Legible (although not necessarily neat)</p>	<p>Rater 1: 4</p> <p>Rater 2: 4</p> <p>Rater 3: 4</p> <hr/> <p>Average: 4</p>	<p>Taking Dictation Reader's Observation:</p> <p><input type="checkbox"/> Read aloud word by word</p> <p><input checked="" type="checkbox"/> Read aloud phrase by phrase</p>	<p>Mechanics Observation:</p> <p><input type="checkbox"/> Full punctuation</p> <p><input checked="" type="checkbox"/> Partial punctuation</p> <p><input type="checkbox"/> No punctuation</p> <p><input checked="" type="checkbox"/> Full capitalization</p> <p><input type="checkbox"/> Partial capitalization</p> <p><input type="checkbox"/> No capitalization</p>
<p>Richard Gentry's Developmental Spelling Rating: (see http://jrichardgentry.com)</p> <p><input type="checkbox"/> Precommunicative (child uses symbols from the alphabet but shows no knowledge of letter-sound correspondences)</p> <p><input type="checkbox"/> Semiphonetic (child begins to understand letter-sound correspondence and that sounds are assigned to letters. e.g., <i>U</i> for <i>you</i>)</p> <p><input checked="" type="checkbox"/> Phonetic (child uses a letter or group of letters to represent every speech sound that they hear in a word. e.g., <i>KOM</i> for <i>come</i> and <i>EN</i> for <i>in</i>)</p> <p><input type="checkbox"/> Transitional (speller begins to assimilate the conventional alternative for representing sounds, moving from a dependence on phonology (sound) for representing words to a reliance on visual representation and an understanding of the structure of words. e.g., <i>EGUL</i> for <i>eagle</i> and <i>HIGHEKED</i> for <i>hiked</i>)</p> <p><input type="checkbox"/> Correct (speller knows the English orthographic system and its basic rules)</p>			

Considerations:

- Spacing and Letter Formation: *good*
- Posture: *good—left-handed mature tripod grasp*
- Vocalization or Subvocalization: *none noted*
- Concentration, Attention and Fatigue: *good focus and concentration*
- Frustration level: *none noted*

DATA GATHERING: PROTOCOL TASK 3—TYPING FROM DICTATION

Our typing-from-dictation task requires the student to type the same short passage that was previously read aloud. With this task, we are measuring everything from the previous writing task, plus keyboarding skills. We make sure to turn off all of the “keyboard goodies” (auto spell check, capitalization, etc.) before we have the student begin typing. This way we can note whether the student knows how to appropriately use the shift key to capitalize, and s/he is not tipped off to any misspelled words. We also look at his/her familiarity with the keyboard—does s/he use one finger to hunt and peck? Or, is s/he a proficient ten-finger typist?

If the student has significant spelling challenges and we already know that spelling is the issue that makes writing unreadable, then we would actually bypass the dictation task and instead do typing from copy (usually the sentence from the WOLD) to evaluate the student’s keyboarding skills. Our feeling is that there is no need to completely frustrate the student if it is not the skill we are interested in measuring.

For the typing-from-dictation task, Cathy was able to type 9.1 words per minute which is about one word per minute less than her handwriting; however, her spelling accuracy went from 35% correct with handwriting to 42% with typing. Her familiarity with the keyboard was good (“beginning ten-finger typist”), but her typing speed was slow enough (i.e., less than about 10 words per minute) so that a word prediction program might be a good possibility to help with spelling.

Here is how we would fill out the third page of our protocol for Cathy:

Typing from Dictation

Sentence # used: **#5.5**

<p>Total # of Words typed: 43</p> <p>Time: 4:45 (4.75 minutes)</p> <p>Words Per Minute: 9.7</p>	<p>5 seconds = .08 minutes 10 = .17 15 = .25 20 = .33 25 = .42 30 = .5 35 = .5 40 = .67 45 = .75 50 = .83 55 = .92</p>	<p>Taking Dictation Reader’s Observation:</p> <p><input type="checkbox"/> Read aloud word by word</p> <p><input type="checkbox"/> Read aloud phrase by phrase</p>	<p>Spelling:</p> <p>Grade Level (K-5) _____</p> <p>‘No Excuse’ Words _____</p> <p>% spelled correctly: _____</p> <p>Total # of words 43</p> <p>(grades 6-12)</p> <p>% spelled correctly: 42%</p>
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Typing Style: <input type="checkbox"/> One finger, hunt & peck <input type="checkbox"/> Two finger, hunt & peck <input type="checkbox"/> Multiple finger typist <input checked="" type="checkbox"/> Beginning 10 finger typist <input type="checkbox"/> Ten finger typist	Mechanics Observation: <input type="checkbox"/> Full punctuation <input checked="" type="checkbox"/> Partial punctuation <input type="checkbox"/> No punctuation <input checked="" type="checkbox"/> Full capitalization <input type="checkbox"/> Partial capitalization <input type="checkbox"/> No capitalization	Developmental Spelling Stage: <input type="checkbox"/> Precommunicative <input type="checkbox"/> Semiphonetic <input checked="" type="checkbox"/> Phonetic <input checked="" type="checkbox"/> Transitional <input type="checkbox"/> Correct
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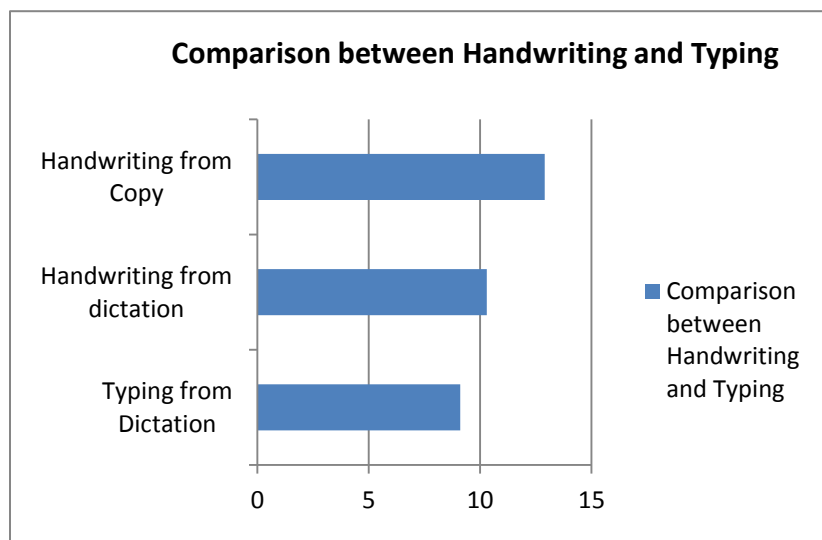
Considerations:

- Typing mechanics (space bar for spacing, shift key for capitals, etc): *emerging*
- Posture: *good*
- Vocalization or Subvocalization: *none*
- Concentration, Attention and Fatigue: *good*
- Frustration level: *no problems noted*

SUMMARY FOR CATHY

Writing output comparison table

Assessment	Speed	Spelling correctness	Writing Mechanics
Handwriting – copying (WOLD)	12.9 WPM	n/a	n/a
Handwriting - dictation	10.3 WPM	35%	Not evident
Typing - dictation	9.1 WPM	42%	Not evident



DATA GATHERING: OPTIONAL PROTOCOL TASKS

Depending on the findings of our first three tasks, we will sometimes do “extension testing” with word prediction, a spell check program (MS Word or Write:OutLoud), and/or speech recognition.

We had Cathy try Co:Writer word prediction. This strategy did not increase her typing speed, but it did improve her spelling appreciably, as she was able to visually or auditorily recognize many of the correct word choices as they appeared.

“THE QUESTION”

Our data gathering typically ends with a student-preference question: “If you had to write an essay or report, would you prefer to print, use cursive, typing, or typing with word prediction?” Student input and buy-in is absolutely CRUCIAL to determine whether the assistive technology strategy that seems most appropriate to US will be accepted or abandoned by the student over the long term. Many factors can play into this—accessibility, portability, ease of use, and the “coolness” factor—will the student appear different and/or be accepted by his/her peers while using this technology?

THE AT TOOLBOX



Now that we have gathered data about the student’s learning style and writing/typing performance, we can brainstorm about possible technologies to try out—drawing from our “AT Toolbox” to see what might be appropriate: graphic organizers, speech recognition, text-to-speech, word prediction, typing tutors, spellcheckers, text-and-picture software, alternative keyboards, portable word processors, etc.

- **Graphic organizers**-- Many of the teachers we work with already use some sort of paper-based graphic organizer as a pre-writing strategy to generate and organize ideas and brainstorm before actually beginning to write the assignment. There are a number of software programs that will do this as well, and some (like Inspiration) have ready-made templates for specific types of assignments: persuasive essays, literary comparisons, historical episodes, lab reports, etc. Inspiration will actually automatically convert the visual concept-diagrams to outline form. This strategy is useful for students who need help with

organization, or think visually. A number of graphic organizer tools (some available as downloadable freeware) are listed in the Appendix on page 27.

- **Speech recognition**—This term refers to software that converts auditory speech to visual text—so called “voice-to-text” software. For many reasons this would be the ideal AT writing solution—you speak, it writes—like in science fiction movies like Star Trek. Unfortunately there are significant problems with this strategy: gross inaccuracy (especially with young people’s voices), the need for accurate (or at least consistent) speech articulation, the need for a LOT of patience and a “literary” way of dictating complete with spoken punctuation, and the ability to self-correct as you go. We have found this strategy to be more appropriate for students with age- and grade- level cognition and reading abilities, who may have a physical disability that inhibits writing. Several readily-available possibilities exist for speech recognition: Dragon Naturally Speaking, the Windows 7 Operating System, Speak Q, and the Dragon Dictate app for the iPhone. We did an informal comparison between several of these and the results are discussed in the Appendix on pages 29 and 30.
- **Text to speech**—This tool enables the student to hear whatever text is written on the computer screen to determine whether the words s/he has inputted are the intended ones. A list of available text-to-speech programs (some available as downloadable freeware) are listed in the Appendix (p. 31). We have grouped text readers with screen readers with talking word processors—there are many choices from the simplest with only a few voices to choose from, to the most complex (and expensive) with lots of bells and whistles.
- **Word prediction**—This is the type of software program in which you type a letter, various word choices pop up, and you pick the one you want. It was originally designed for people with injuries or physical disabilities in order to cut down on the number of keystrokes. We recommend it for students who are poor spellers (all they need to get is the first one or two letters in the word) and students who have fine motor difficulties and type slowly (say, less than 8-10 words-per-minute). There are a number of possibilities for word prediction programs, and each one has different features and ways of customizing the user interface. A good source for comparison among these products is the Spectronics website at www.spectronicsinoz.com/article/word-prediction-software-comparison-chart The Evmenova et al. article listed in the Bibliography may also be of interest.
- **Typing tutor programs**—Many times we just recommend that a student improve his/her typing speed, especially if they are good spellers and have solid basic skills at keyboarding. Two possibilities that we usually mention are Roller Typing (particularly good for older elementary school students) and Read Write and Type (incorporates phonemic awareness). There are many other online possibilities like Dance Mat Typing and a lot of downloadable freeware (see the Appendix p. 32 for a listing).
- **Spell checking**—Spell checking features have long been available for many of the popular computer-based word processing programs. Most spell checkers will be able to catch single-word discrepancies between “believe” and “receive” and “perceive” and “relieve”—actual misspellings. But what of this poem?

Eye have a spelling chequer,
It came with my Pea Sea.
It plane lee marks four my revue
Miss Steaks I can knot sea.
Eye strike the quays and type a whirred
And weight four it two say
Weather eye am write oar wrong
It tells me straight a weigh.

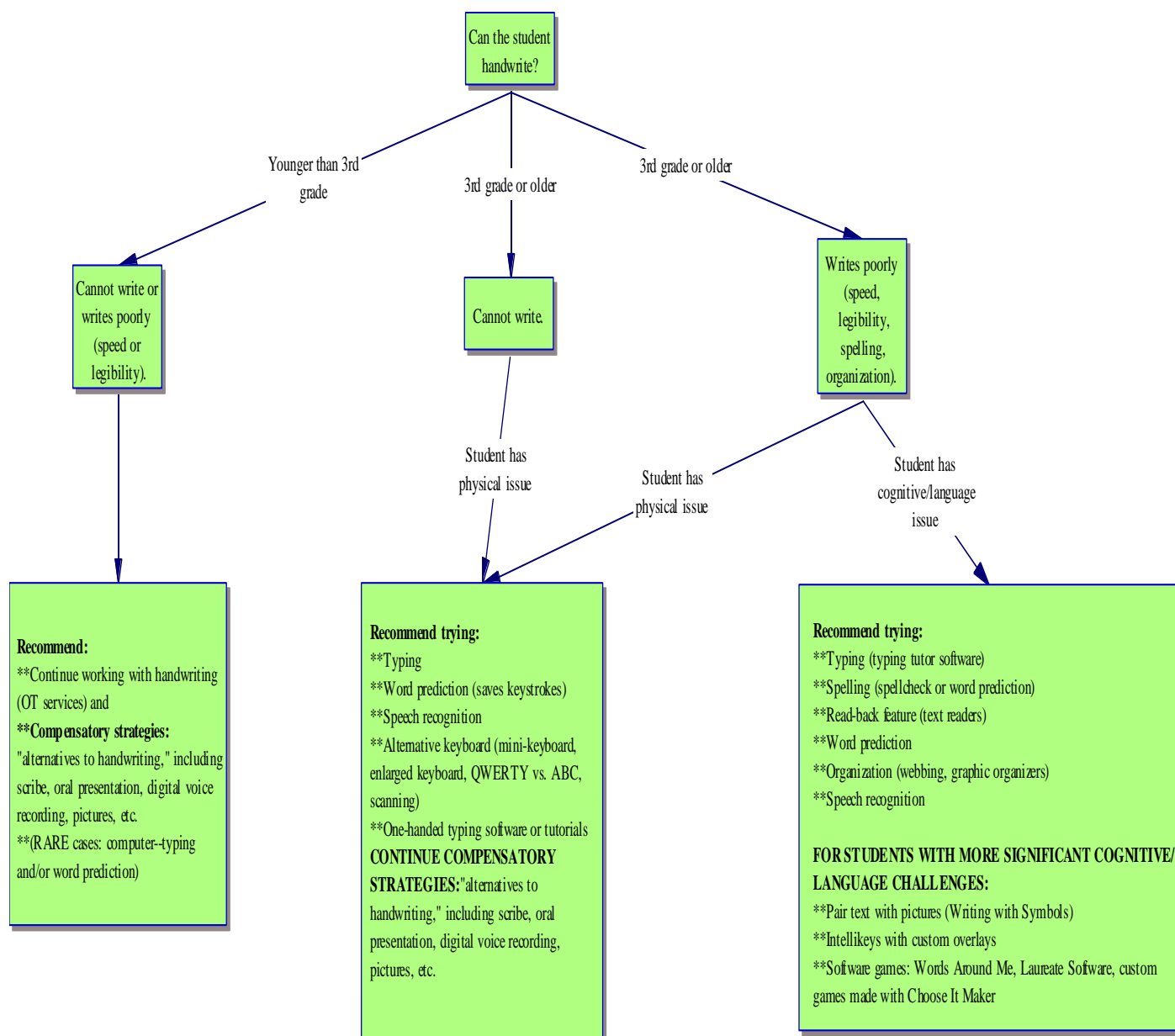
Eye ran this poem threw it,
Your shore real glad two no.
Its vary polished in its weigh.
My chequer tolled me sew.
A chequer is a bless thing,
It freeze yew lodes of thyme.
It helps me right all stiles of righting,
And aides me when eye rime.
Each frays come posed up on my screen
Eye trussed too bee a joule.
The chequer pours o'er every word
Two cheque sum spelling rule.

Not many spell checkers would be able to catch the mistakes in this because they are not actual misspellings but are contextual mistakes—in the past decade or so contextual spellcheckers and grammar checkers have been developed so that you can check spelling in the body of your text and the mistakes will be noted based on the surrounding words. We have done an informal comparison of some of the most popular spellcheckers and the results are discussed in the Appendix, starting on page 33.

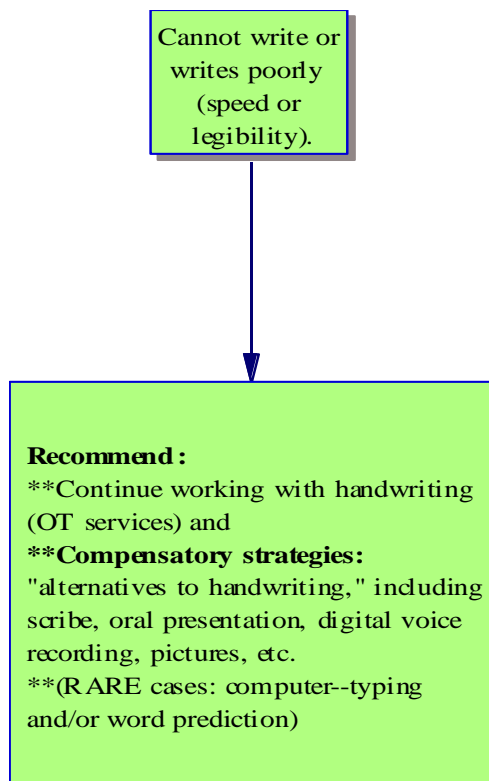
- **Text-and-picture software**—For some students that might need added reinforcement for the words that are typed, we recommend a program that pairs the text with pictures—either stylized line drawings or actual digital pictures. Several programs that we have found useful are: Writing with Symbols, PixWriter, Picture It, and the “symbolate” feature in Boardmaker Plus, version 6. You can also create “word boards” of specific vocabulary of interest for some of these programs, thereby limiting the choices a student has to make to create a sentence.
- **Hardware strategies**—Two main categories of hardware tools that we recommend are alternative keyboards and portable word processors. Alternative keyboards such as the mini-keyboard or the ABC keyboard can be useful for students with specific physical, cognitive, and/or fine motor challenges. The Intellikeys keyboard can also be particularly useful since you can easily change the overlays and even create your own custom overlays specifically designed for the student. Portable word processors such as the AlphaSmart, Writer, Fusion, Neo, Netbook, or laptop can be useful for the student who needs to type and/or access particular assistive technology software (such as Co:Writer or Writing with Symbols) in multiple locations or classrooms during the school day.

FEATURE MATCHING

So we have completed the Writing Evaluation and learned something of the student’s learning and writing profile. We have considered the tools in our toolbox. In order to generate specific suggestions or recommendations, we need to “feature match” the appropriate technology with the student profile we have generated. We have written out a flow chart or “decision tree” that summarizes our thought process or decision-making process that we use during our Writing Evaluations. We divide the “tree” into three main “branches” based on the basic description of the student: If the student is younger than 3rd grade, if the student is 3rd grade or older and cannot write, if the student is 3rd grade or older and “writes poorly”—either in terms of speed, legibility, spelling, and/or organization.



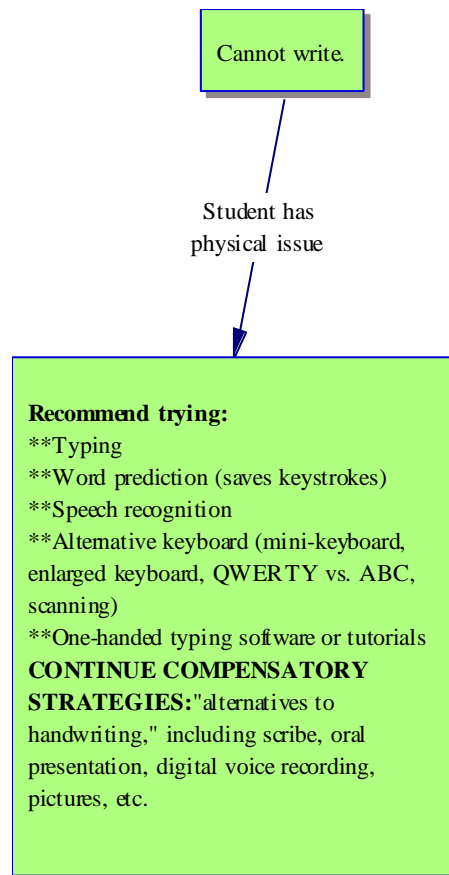
- **First “branch”: Student is younger than third grade and cannot write (or writes poorly)**



As previously mentioned, we usually do not have our BVSD students begin keyboarding until 3rd or 4th grade so that if the student is younger than this, we usually suggest that s/he continues to work with the Occupational Therapist on improving handwriting skills. Compensatory strategies in the meantime can include allowing for “alternatives to handwriting” (this can include scribing, oral presentation, digital voice recording, pictures, etc.). Occasionally, if the prognosis for handwriting improvement is poor (i.e., if there is some physical problem impeding fine motor improvement), we suggest trying typing, word prediction, and in very rare cases, speech recognition.

One student (we can call this student Meredith) we assessed in first grade has an actual physical deformity and is missing most of her fingers. Meredith is bright and capable, so we suggested that she try word prediction, and an Intellikeys alternative keyboard with a keyguard. It takes her awhile to type out her message, even with the enlarged Intellikeys overlays so we incorporate Co:Writer as part of her assistive technology “package” in order to minimize the number of keystrokes she needs to make. We also introduced speech recognition (Dragon Naturally Speaking) as a possibility, even though it is definitely not accurate enough for her to work on classroom assignments—our reasoning is that at some point in the future her voice (and speech articulation patterns) will mature and the software will become more and more accurate with later versions. It will be to her advantage to at least have some familiarity with this tool so that she can easily incorporate this as a strategy in the future.

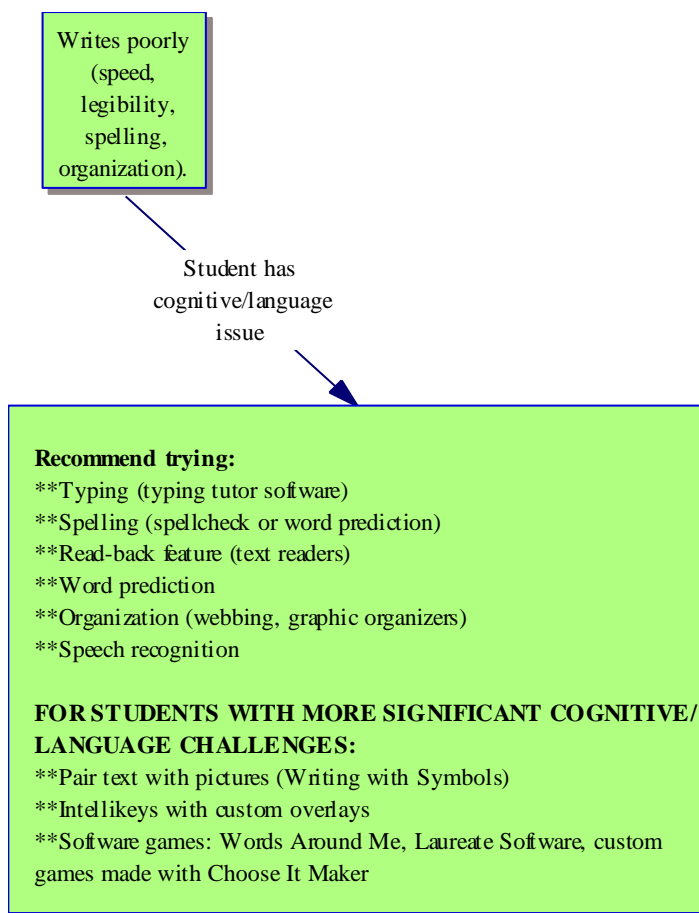
- Second “branch”: Student is third grade or older and cannot write



We always encourage the use of “alternatives to handwriting”—scribing, oral presentation, digital voice recording, use of pictures, use of “cartooning” software such as “Comic Life,” etc. For students in 3rd grade or above with some type of physical and/or fine motor issue, we can usually assume s/he has been introduced to keyboarding in class, so we can introduce strategies to help with keyboarding, either with hardware (e.g., alternative keyboards such as a mini-keyboard or an Intellikeys keyboard), or with software designed to minimize keystrokes (e.g., word prediction or speech recognition).

One fourth grade student (we can call him Ted) is 9 years old and has spastic cerebral palsy and is a poor speller. He has been using a scribe for the majority of written assignments and his family was interested in the possibility of using speech recognition. Because of Ted’s fine motor issues his handwriting and typing speeds were slow—between 2 and 6 words per minute. We tried an Intellikeys keyboard but it actually slowed him down (4 words per minute). We also tried speech recognition (the iPhone app) to see if he might be a possible candidate for this strategy; however, his speech articulation was neither accurate nor consistent enough to consider this as a viable possibility. During the assessment we saw that Ted’s knowledge of the keyboard is relatively strong (he had had a keyboarding class that year). We therefore recommended that he use a typing tutorial program to increase his typing speed and in the meantime, try using the Co:Writer word prediction software to speed up his writing output and improve his spelling (we had trialed this during the evaluation and it helped him and he enjoyed using it).

- **Third “branch”: Student is third grade or older and writes poorly**



This student profile is probably the one for which we get most referrals—the students who are poor spellers and/or readers, students who have difficulty generating and organizing their thoughts, and the ones who are slow at getting their thoughts onto paper in a well-expressed, grammatical fashion. Our strategies primarily deal with trying various types of software since these students have at least some familiarity with keyboarding and using the computer. We might suggest trying typing tutor software (to refine keyboarding skills and increase speed), spellcheck features or word prediction, text-to-speech software (talking word processors), organizational software, and, occasionally, speech recognition. If the student has significant cognitive and/or language challenges (or relates well to pictures rather than words), we may suggest trying software that pairs the text with pictures: Writing with Symbols, PixWriter, or the symbolate feature in Boardmaker Plus v. 6.

We evaluated a student we’ll call Benjamin, a fourth grader who receives special education services under a “Speech Language Disability” designation. Benjamin has great ideas but has difficulties with writing speed, legibility and spelling (as well as reading). His handwriting is quicker than his typing (11-13 words per minute for handwriting as opposed to 7 words per minute for typing) but both are unintelligible or incomprehensible because of substantial spelling errors. Since Benjamin’s speech articulation is not clear enough to warrant trialing speech recognition software, we looked instead to word prediction (Co:Writer) to help improve both his typing speed and his spelling. Since his reading is also an area of challenge we suggested using the auditory feedback feature in Co:Writer so that the word choices can be read to him sequentially. We also

suggested using a text-to-voice program (Write:OutLoud or WYNN) so that he could make sure that the words that he had chosen were the ones that he intended to communicate. In addition, we suggested using a typing tutor program to increase his speed and keyboarding skills, as well as a digital voice recorder so that he could be sure that his great ideas would be recorded in some fashion and he would not forget them.

FINAL STAGES

The final part of the AT Writing Evaluation consists of re-convening with the school team and family (if they have stayed through the assessment) to present our results, review various strategies and possible alternatives, and discuss our recommendations. This portion of the evaluation is particularly important as questions inevitably arise and can be addressed immediately. The assistive technology action plan for follow-up activities can be discussed and set up, hardware delivery and software installation can be scheduled, and student and staff trainings can be arranged.

After the evaluation has been completed, the AT Team case manager for the student's school generates a comprehensive written report containing: background information, issues discussed at the evaluation, the assessment data, a discussion of various assistive technology strategies and their pros and cons, the actual recommended strategies, and a timetable for implementation. This document becomes part of the student's IEP and will follow him/her as s/he progresses through grades and schools (and districts, if the student moves) and is a source of important information to special education teachers and staff who work with the student.

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**APPENDIX:
PROTOCOL, FORMS, GRADE-LEVEL SENTENCES,
TOOL BOX MATERIALS**

BVSD Assistive Technology Writing Assessment Protocol

WOLD Sentence Copying Test (©2001 Optometric Extension Program Foundation, Inc.). — Utilized to determine if the child has the ability to rapidly and accurately copy a sentence from the top to the bottom of a page. A necessary skill to keep up with classmates.

<p># of words (29 if no omissions):</p> <p>Time:</p> <p>WPM:</p> <p># of letters (110 if no omissions):</p> <p>LPM:</p>	<p>5 secs = .08 mins</p> <p>10 = .17 15 = .25 20 = .33 25 = .42 30 = .5 35 = .5 40 = .67 45 = .75 50 = .83 55 = .92</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Grade equiv:</th> <th style="text-align: center;">WPM (words per minute)</th> <th style="text-align: center;">LPM (letters per minute)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">7.9-10.5</td> <td style="text-align: center;">30-40</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">10.5-11.1</td> <td style="text-align: center;">40-42</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">12.1-13.2</td> <td style="text-align: center;">46-50</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">13.3-15.8</td> <td style="text-align: center;">50.5-60</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">14.4-17.7</td> <td style="text-align: center;">54.5-67</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">15.6-19.5</td> <td style="text-align: center;">59-74</td> </tr> <tr> <td style="text-align: center;">8</td> <td style="text-align: center;">16.6-21.1</td> <td style="text-align: center;">63-80</td> </tr> </tbody> </table>	Grade equiv:	WPM (words per minute)	LPM (letters per minute)	2	7.9-10.5	30-40	3	10.5-11.1	40-42	4	12.1-13.2	46-50	5	13.3-15.8	50.5-60	6	14.4-17.7	54.5-67	7	15.6-19.5	59-74	8	16.6-21.1	63-80	
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<p>Legibility Rating:</p> <p>5) Almost completely illegible</p> <p>6) Parts illegible</p> <p>7) Difficult to read but decipherable with context</p> <p>8) Legible (although not necessarily neat)</p>	<p>Rater 1:</p> <p>Rater 2:</p> <p>Rater 3:</p> <p>Average:</p>	<p>Mechanics Observation:</p> <p><input type="checkbox"/> Full punctuation</p> <p><input type="checkbox"/> Partial</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Full capitalization</p> <p><input type="checkbox"/> Partial</p> <p><input type="checkbox"/> None</p>	<p>Copying Text (fixations) Observation:</p> <p><input type="checkbox"/> Letter by letter</p> <p><input type="checkbox"/> Word by word</p> <p><input type="checkbox"/> Phrase by phrase</p>																								

Considerations:

- Spacing and Letter Formation:
- Posture:
- Vocalization or Subvocalization:
- Concentration, Attention and Fatigue:
- Frustration level:

Comments:

Writing from Dictation

Sentence # used: _____

Total # of Words in sentence:	5 seconds = .08 minutes	Spelling:
Time:	10 = .17	Grade Level (K-5) _____
	15 = .25	'No Excuse' Words _____
	20 = .33	% spelled correctly: _____
	25 = .42	
	30 = .5	Total # of words _____
	35 = .5	(grades 6-12)
Words Per Minute:	40 = .67	% spelled correctly: _____
	45 = .75	
	50 = .83	
	55 = .92	

Handwriting Legibility Rating:		Taking Dictation Reader's Observation:	Mechanics Observation:
5) Almost completely illegible	Rater 1:	<input type="checkbox"/> Read aloud word by word <input type="checkbox"/> Read aloud phrase by phrase	<input type="checkbox"/> Full punctuation <input type="checkbox"/> Partial punctuation <input type="checkbox"/> No punctuation <input type="checkbox"/> Full capitalization <input type="checkbox"/> Partial capitalization <input type="checkbox"/> No capitalization
6) Parts illegible	Rater 2:		
7) Difficult to read but decipherable with context	Rater 3:		
8) Legible (although not necessarily neat)	_____		
	Average:		

Richard Gentry's Developmental Spelling Rating: (see <http://jrichardgentry.com>)

- Precommunicative (child uses symbols from the alphabet but shows no knowledge of letter-sound correspondences)
- Semiphonetic (child begins to understand letter-sound correspondence and that sounds are assigned to letters. e.g., *U* for *you*)
- Phonetic (child uses a letter or group of letters to represent every speech sound that they hear in a word. e.g., *KOM* for *come* and *EN* for *in*)
- Transitional (speller begins to assimilate the conventional alternative for representing sounds, moving from a dependence on phonology (sound) for representing words to a reliance on visual representation and an understanding of the structure of words. e.g., *EGUL* for *eagle* and *HIGHEKED* for *hiked*)
- Correct (speller knows the English orthographic system and its basic rules)

Considerations:

- Spacing and Letter Formation:
- Posture:
- Vocalization or Subvocalization:
- Concentration, Attention and Fatigue:
- Frustration level:

Comments:

Typing from Dictation

Sentence # used: _____

<p>Total # of Words typed:</p> <p>Time:</p> <p>Words Per Minute:</p>	<p>5 seconds = .08 minutes 10 = .17 15 = .25 20 = .33 25 = .42 30 = .5 35 = .5 40 = .67 45 = .75 50 = .83 55 = .92</p>	<p>Taking Dictation Reader's Observation:</p> <p><input type="checkbox"/> Read aloud word by word</p> <p><input type="checkbox"/> Read aloud phrase by phrase</p>	<p>Spelling:</p> <p>Grade Level (K-5) _____</p> <p>'No Excuse' Words _____</p> <p>% spelled correctly: _____</p> <p>Total # of words (grades 6-12) _____</p> <p>% spelled correctly: _____</p>
<p>Typing Style:</p> <p><input type="checkbox"/> One finger, hunt & peck</p> <p><input type="checkbox"/> Two finger, hunt & peck</p> <p><input type="checkbox"/> Multiple finger typist</p> <p><input type="checkbox"/> Beginning 10 finger typist</p> <p><input type="checkbox"/> Ten finger typist</p>	<p>Mechanics Observation:</p> <p><input type="checkbox"/> Full punctuation</p> <p><input type="checkbox"/> Partial punctuation</p> <p><input type="checkbox"/> No punctuation</p> <p><input type="checkbox"/> Full capitalization</p> <p><input type="checkbox"/> Partial capitalization</p> <p><input type="checkbox"/> No capitalization</p>	<p>Developmental Spelling Stage:</p> <p><input type="checkbox"/> Precommunicative</p> <p><input type="checkbox"/> Semiphonetic</p> <p><input type="checkbox"/> Phonetic</p> <p><input type="checkbox"/> Transitional</p> <p><input type="checkbox"/> Correct</p>	

Considerations:

- Typing mechanics (space bar for spacing, shift key for capitals, etc):
- Posture:
- Vocalization or Subvocalization:
- Concentration, Attention and Fatigue:
- Frustration level:

Comments:

***Student Preference:** (print, cursive, typing or word prediction)

***Additional Trials/Observations:** (Co:Writer, Microsoft Word 2007 Spell-Check, Dragon Dictation, etc.)

Grade Level No Excuse Sentences (No Excuse words are boldfaced)

First Grade:

#1.1 How **are you** and your dog doing after **a** cat scratched your dog **in the** house? Boy **was he** mean **for** doing **that**. **Is it** OK? (11 spelling words, 26 words, 92 characters)

#1.2 **It was you** who told me **that** it **is** hot **in** here. **He** said that **the** heat is **on** and you **are** hot. (10 spelling words, 23 words, 69 characters)

#1.3 **He** likes **to** climb **on the** tree **that is in** my back yard. **You and he** can climb **it** now **for** the fun **of** it. (13 spelling words, 25 words, 77 characters)

Second Grade:

#2.1 **There** is **an** apple for **each one** of your sisters. **When** you give **all** of them, **they will** need to know **if** it is **from** Bob or me. (10 spelling words, 28 words, 95 characters)

#2.2 **They said** that **there will be** no more candy for us **from this** bag, **but** they **were** wrong. **We can have** all the candy **we** want, **but I** will **not** eat it now. (17 spelling words, 33 words, 115 characters)

#2.3 **I will** hear **from** you **about your** party **as** soon as I **can**. My Dad **said there were** lots of kids that came, **but not their** dogs or cats. (13 spelling words, 29 words, 102 characters)

Third Grade:

#3.1 **After she called** out, **people** came **down** to **see** if it really was **him**. **Only** one man **could make so many** come. Some even jumped **into** some **very** cold **water just** to get a **look** at him. **Did you know** him? (19 spelling words, 41 words, 153 characters)

#3.2 **People** all **over these** parts **just know him**. He **has** a **long** history of doing **very** funny shows. But **who** can **find** him **after** he has **made** his jokes and jumps **down** from the stage? (14 spelling words, 35 words, 137 characters)

#3.3 I want **him** to **make my little** dog happy. I **know she** will **like her** if he **could just see** the **way** she can **use** her paws to carry **water**. (14 spelling words, 30 words, 101 characters)

#3.4 **After** he **called** me I **did** not **know** what to do. I **could** not go **out** to **see who** had **made** the **people so** **very** angry. (12 spelling words, 26 words, 85 characters)

#3.5 I **would like** to **use very little** **water** when I **make** this cake. I **know** that **most people may** like **more than** that, but I **only** want to use **two** cups and **then** a little more salt. (16 spelling words, 37 words, 134 characters)

#3.6 **After** he **called her some** bad names, **many people could** see that **she** felt **very** hurt. **Who would** **know these little words** could **make some other** person feel **so down** and **out**? (22 spelling words, 32 words, 136 characters)

Fourth Grade:

#4.1 I **must tell** that **man something** very **important because** I **want** to stay in **school**. He will think all I care about is the **good food** and **new children** in school if I don't tell him that I care about how well I **read**. (13 spelling words, 44 words, 166 characters)

#4.2 I **thought** that **together** we could do **something different**. I **always** wanted to **put** my name on something **important**, such as a **house** or **school**. What in the **world** do you **want** to do? (11 spelling words, 34 words, 142 characters)

#4.3 I **often think** about **another school** I **went** to **until** this **last** year. I **might tell** you about **something important** I **saw** there, || but I really **should show** you the **next** time we are **together**. (12 spelling words, 23 words, 100 characters), || (16 spelling words, 35 words, 148 characters)

#4.4 I **think** that the **children** are **going together** to a **place** by the **old school**, where I **often** like to **go** and **read** a book. Mom and Dad **went** there **last** week || and they **say** that they **never saw** so many **different** kinds of flowers in the **same place**. (12 spelling words, 32 words, 118 characters) || (18 spelling words, 49 words, 188 characters)

#4.5 **Take such great** care to **give** the **children** what is **important**. We play **our own part** and none of our parts are **too small**. (11 spelling words, 24 words, 95 characters)

Fifth Grade:

#5.1 My **father began** to **change** his mind about moving our **family** from the **country** to the **city**. He **heard several** people mention that **it's** possible to go a **whole year without** work. (12 spelling words, 32 words, 141 characters)

#5.2 At this **point** I don't want to **play** in your **room** with you if you cannot **let** me have a **turn**. **It's** been **several** turns **since** I have had the chance to **try** to **move** my piece **across** the board. (11 spelling words, 40 words, 145 characters)

#5.3 One **morning, father** and **mother took** the **family** to the **country** to **fish** by the **sea**. They **took** the **car** and went **night** came they saw they **didn't** have any **money**. Father said to **himself**, "**Live and learn**." (16 spelling words, 38 words, 161 characters)

#5.4 **Above** all, it is **better** to **face** your **family** rather than **live** in fear. They will **almost** always let you live no **matter** what you did to cost them **money**. **Without** you, **life** on **earth** would not be the same. || The **sun** could not move **toward** the sky! **However**, it **sure** is a nice **thing** to not **need** forgiveness. (11 spelling words, 40 words, 160 characters) || (17 spelling words, 59 words, 238 characters)

#5.5 **Toward morning** when the **light** of the **sun** shines in my **face** I begin to **hear** the sounds of **life**. **Today** I am **sure** to get up because in this **country** one must earn **money since** we can't **live** off of dreams **alone**. (14 spelling words, 43 words, 163 characters)

Graphic Organizers

Free Graphic Organizer Resources:

Bubbl.us Brainstorming and Organizing Tool good for visual thinkers/learners, easy to use, customizable features, sharing capabilities-- <https://bubbl.us>

Prezi- Unique way to present information/ideas and concepts, interactive flow chart, moderate to use-- <http://prezi.com/>

Read/Write/Think Index of Tools-- A list of possible tools available on the Read/Write/Think website (c/o Verizon Thinkfinity). <http://www.readwritethink.org/classroom-resources/student-interactives/>

Read/Write/Think Webbing Tool-- Allows you to create simple graphic organizers, easy to use-- http://interactives.mped.org/view_interactive.aspx?id=127&title

Read/Write/Think Story Map Tool - Quickly create a visual of complex information, easy to use-- <http://www.readwritethink.org/files/resources/interactives/storymap/>

Read/Write/Think Interactive Timeline— Create timelines, easy to use-- <http://www.readwritethink.org/files/resources/interactives/timeline/index.html>

Gliffy Create and share diagrams on the Web <http://www.gliffy.com/>

Belvedere - Downloadable graphic organizer, designed for k-12 population, moderate to use. <http://belvedere.sourceforge.net/>

Graphic Organizer Templates - 40 downloadable templates to use in a word processing program, quick, easy to use <http://www.learnalberta.ca/content/ssass/html/graphicorganizers.html>

Great Source iWrite: Graphic Organizer Templates - click on "Writer's Tools" and then narrative, expository, persuasive, response to literature or research templates to use in a word processing program. Easy to use. <http://www.greatsource.com/iwrite/students.html>

Eduplace- Provides many graphic organizers ready to download. <http://www.eduplace.com/graphicorganizer/>

Edhelper- Offers simple graphic organizers for elementary. http://www.edhelper.com/teachers/graphic_organizers.htm

Free Mind - mind-mapping tool http://freemind.sourceforge.net/wiki/index.php/Main_Page

Mindomo - mind-mapping tool, has Microsoft Word-like features <http://www.mindomo.com/>

Exploratree - thinking guides and more (definitely worth exploring) <http://www.exploratree.org.uk/>

Recall Plus - Students can organize their notes, create flashcards, make use of 3D tools and more in this great mind mapping tool. It is downloadable. <http://recallplus.com/index.php>

Best4C-(for upper grades) <http://www.best4c.com/>

CMap - concept maps <http://cmap.ihmc.us/>

Character Scrapbook- Analyze characters with this organizer from Scholastic
<http://teacher.scholastic.com/activities/scrapbook/>

Text2MindMap- Create a simple idea web by simply typing the ideas into an outline
<http://www.text2mindmap.com/>

CAST Science Writer- Helps students write a science lab report using chunking, prompting, and graphic organizers <http://sciencewriter.cast.org/welcome>

Intel Visual Ranking Tool- Analyzing & prioritizing information.
<http://educate.intel.com/en/thinkingtools/Visualranking/>

Intel Cause and Effect Tool- Create diagrams or causal maps
<http://www97.intel.com/en/ThinkingTools/SeeingReason>

Intel Defending Arguments Tool- Analyzing & evaluating data.
<http://www97.intel.com/en/ThinkingTools/ShowingEvidence>

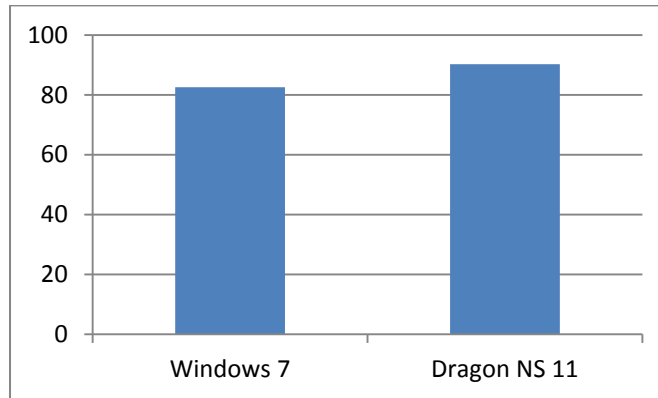
Graphic Organizer Software for Purchase:

Webspiration- Graphic organization good for visual thinker/learners, EASY to use, advanced feature, sharing capabilities, customizable, developed by creators of Inspiration/Kidspiration (no longer free)
<http://www.mywebspiration.com/>

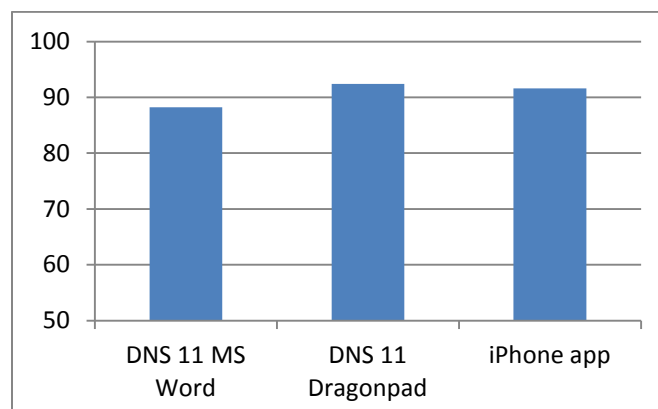
Inspiration/Kidspiration—Premier graphic organizing software (Kidspiration is for younger students). Features many templates for various tasks (Language Arts, Social Studies, Science, etc.) <http://www.inspiration.com>

SPEECH RECOGNITION—A Discussion

- We conducted an informal test between Dragon Naturally Speaking version 11 and the Windows OS 7. Using the three members of our team as testers, we trained or enrolled the software (i.e., read specific passages into the computer to have the program become familiar with our speech articulation patterns), then dictated three test passages which are favorites of SLPs because of the range and diversity of phonemic content: the Grandfather Passage, the Rainbow Passage, and the Limpy Passage (see these below). We did not make any attempt to self-correct any of the dictated test passages.
- Results: Dragon 11 was more accurate—a little more than 9 out of 10 words correct while Windows OS 7 was a little more than 8 out of 10



- We did another informal test using Dragon Naturally Speaking v.11 dictating to MS Word, using Dragon 11 with dictating to Dragon Pad (the onboard Dragon word processing app), and the Dragon Dictate app on the iPhone. Results:
 - Dragon dictating to Dragon Pad was the most accurate (therefore it would make most sense to dictate to Dragon Pad and then copy and paste to MS Word to edit), but SURPRISINGLY, the Dragon Dictate iPhone app was almost as good.
 - There are two things to keep in mind: the iPhone app references the vast speech database on the Nuance company website. This means while it is quite accurate to begin with, it will never get any more accurate for YOUR voice (whereas the full Dragon Naturally Speaking program can be refined and made more accurate as you refine your voice file). However, because the iPhone app is so accurate “right out of the box,” it would make an ideal screening tool to see if a student might be a good candidate for this type of strategy.



- If you are unfamiliar with using this type of software, citing statistics such as 80% or 90% is interesting but not informative. The problem with using this type of strategy is that the transliterated text consists of all bonafide words that sound like what you said, but may not make any sense when you put them together:
 - **Target:** When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow.
Dictation result: Rana some rinks drake's raindrops in the air, the act like a prison and form in Reno.
 - **Target:** Limpy is a fuzzy yellow baby duck. He belongs to a fisherman.
Dictation result: Maybe this look closely, you'll the peacock. He belongs to a fisherman.
- ***We therefore recommend this strategy rarely and usually for students with a physical disability that would prevent them from physically writing.

Speech Recognition Test Passages

My Grandfather

You wish to know all about my grandfather. Well, he is nearly 93 years old, yet he still thinks as swiftly as ever. He dresses himself in an ancient, black frock coat, usually minus several buttons. A long, flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost respect. When he speaks his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon a small organ.

Except in the winter when the snow or ice prevents, he slowly takes a short walk in the open air each day. We have often urged him to walk more and smoke less but he always answers, "Banana oil!" Grandfather likes to be modern in his language.

The Rainbow

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. A rainbow is the division of white light into many beautiful colors. These take the shape of a large, round arch, with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Limpy

Limpy is a fuzzy, yellow, baby duck. He belongs to a fisherman. The fisherman lives in a little house by the bay. Every morning children go swimming in the bay. About 10:00, Limpy waddles out to the road to wait for the children. When he hears them coming he begins a loud, excited quacking. The children always bring bread or corn for Limpy. He will nip at their fingers or peck at their bare toes until he is fed. Limpy never follows the children down to the shore. He likes to swim in his own little pond. It is much safer.

TEXT-TO-SPEECH SOURCES

- **WYNN, Kurzweil 3000, and Read and Write (Gold)** are expensive but have a LOT of nice features (including a feature to easily enlarge the text, put a different color background behind it, read the highlighted text, etc.

WYNN: www.freedomscientific.com/LSG/products/wynn.asp

Kurzweil 3000: www.kurzweiledu.com

TextHelp Read and Write (Gold): www.readwritegold.com

Look for these less expensive (or free) possibilities:

Natural Reader: www.naturalreaders.com/

ReadPlease: www.readplease.com/

Text Aloud: www.nextup.com/download.html

Balabolka: www.cross-plus-a.com/balabolka.htm

And/or look at the list on the following site:

<http://www.freewarefiles.com/results.php?StartRecord=0&action=&sort=&query=&boolean=&type=&init=233&categoryid=9&subcategoryId=105&programid=0&option=&tab=>

Look for these iPhone, iPod, iPad Apps:

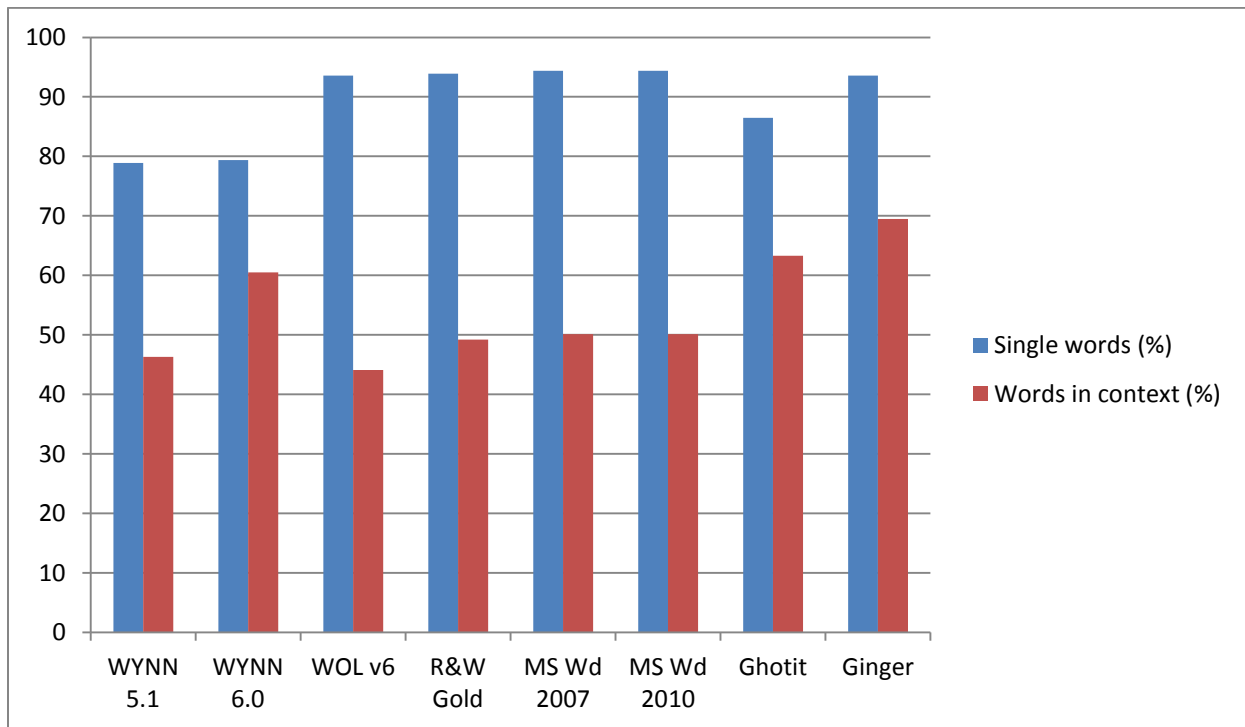
TextToSpeech, TTS, Speak It!, Speak It To Me, Speak Bot, Write&Say, Easy Speak, iSayIt, iSpeakIt, iReader Text to Speech, Voice Generator, etc.

SUGGESTED TYPING TUTORIALS

Dance Mat	Web based-Free	http://www.bbc.co.uk/schools/typing/
Typing Web	Web based-Free	http://www.typingweb.com/typingtutor/
Nimblefingers	Web based-Free	http://www.nimblefingers.com/
Free Typing Games	Web based-Free	http://www.freetypinggame.net/
Learn 2 Type	Web based-Free	http://www.learn2type.com/
KeyBlaze	Web based-Free	http://www.nchsoftware.com/typingtutor/index.html
Glencoe	Web based-Free	http://www.techconnect.glencoe.com/techconnect/keyboarding/start.htm
Power Typing	Web based-Free	http://www.powertyping.com/
Kiran's Typing Tutor	Web based-Free	http://www.kiranreddys.com/download/
TypeOnLine	Web based-Free	http://www.typeonline.co.uk/
Kid's Typing Skills	Web based-Free	http://www.kidwaresoftware.com/kidtype.htm
Tux Typing	Web based-Free	http://tux4kids.alioth.debian.org/tuxtyping.php
TypingTest.com	Web based-Free	http://www.typingtest.com
Roller Typing	CD--\$24.95	http://www.edven.com/rollertyping.html
Type To Learn	CD--\$19.50	http://www.amazon.com/Scholastic-Type-To-Learn-3/dp/043945669X
Read, Write and Type	CD-- \$19.99	http://www.amazon.com/The-Learning-Company-Read-Write/dp/B00029BPLW

SPELLCHECKERS—A Discussion

- We did a comparison for a number of spellcheck programs for both contextual test passages as well as a word list of words-in-isolation.
- Some observations—MS Word (both 2007 and 2010 versions) is quite good for both words-in-isolation and words-in-context and it is likely the most appropriate strategy in most cases since it doesn't require any "special" software beyond what is on most computers. A program such as Write:OutLoud is excellent for words-in-isolation (it uses the Franklin Speller engine); however, it is not as good a choice for words-in-context. Ginger software requires an Internet connection and has the best rating for words-in-context, and since it is designed to be used with MS Word, it has the best rating for words-in-isolation as well.



- The results above are good general "rules of thumb." Ideally we could "custom-test" a student's individual misspelling patterns (and we would be able to do the Writing Evaluation and run the student's actual misspelled words through various spellcheckers and see if the correct choices appear--and further: if the student is able to pick the right choice). A possible form to use for this purpose is included on the next page.

Spell check comparison:

Student:

Date:

Misspelled word:	Microsoft Word		Write OutLoud		WYNN		CoWriter		Other:	
	Correct choice?	Able to ID?	Correct choice?	Able to ID?	Correct choice?	Able to ID?	Correct choice?	Able to ID?	Correct choice?	Able to ID?