CoWriter and DeCoste Writing Protocol
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August 1, 2019

Anne Cronin, Occupational Therapist
- Occupational therapists and occupational therapy assistants help people of all ages participate in the things they want and need to do through the therapeutic use of everyday activities (occupations).
- Occupational therapy helps people function in all of their environments (e.g., home, work, school, community) and addresses the physical, psychological, and cognitive aspects of their well-being through engagement in occupation.

Link to handouts
Difficulties with writing

• Writing is a complex process that involves both the sensorimotor aspects of writing, language abilities and the cognitive components supporting the creating or composing written material.

• The focus here is on the sensorimotor aspects of writing.

Difficulties with writing

• Early writing difficulty is often seen in copying letters (visual perceptual/visual motor deficits)

• Once the letters are learned a common error is in transcription of words (orthographic coding deficits) and spelling (orthographic plus phonological coding deficits).

• Deficits in self-regulation and executive function can also contribute to difficulties
Strategies

EXECUTIVE FUNCTIONING & HANDWRITING

BREAK DOWN WRITING TASKS
MAKE A PLAN. VISUAL CUES ARE KEY
MAKE SHORT ONE STEP TASKS AND DETERMINE HOW LONG EACH SHOULD LAST
ORGANIZED WORK SPACE
LIMIT THE OPTIONS FOR PENCILS/ERASERS
USE A TIMER TO WORK ON SMALL STEPS AT A TIME
BEHAVIORAL CHART FOR HOMEWORK COMPLETION
REWARD SYSTEM WITH ACTIONABLE REWARDS
DICTATION
TRY TYPING VS WRITTEN WORK
VISUAL CHECKLIST FOR MECHANICS

Handwriting Supports

When the student is not successful with regular education supports, an interdisciplinary evaluation of written productivity should be conducted.
AT Written Productivity Evaluation Process

1. Referral Process
2. Assessment/Data Gathering
   - Resource Exploration
   - Feature Matching
   - Equipment/Strategy Trials
   - Identify functional outcomes

Report/Action Plan
   - Assess outcome data and client needs

Assessment of Written Productivity

Before the formal assessment takes place answer these questions:

1. How is the student currently functioning with respect to written language output? Is the student making use of a scribe?
2. What type of learning style does the student seem to present with according to the paperwork? What are the student's strengths and challenges?
3. Are there any technologies (software or hardware) that should be brought to the evaluation to either demonstrate to the team and family or to try out with the student?
4. What are the expectations student/family/teacher for written productivity?
Executive Function Skills and Written Productivity

Common signs of executive function problems in written productivity:

- Difficulty generating ideas
- Trouble articulating ideas
- Problems putting their ideas onto paper
- Difficulty consistently forming the letters legibly
- Simple or minimized written output despite verbally responding to writing prompts
- Trouble initiating writing prompt
- Difficulty organizing work space
- Crumbled paper
- Tearing paper when writing or erasing
- Difficulty with line and spatial awareness on the paper
- Complaints of mechanics of writing (pencil needs sharpened, need better eraser, uncomfortable seat)
- Slow writing speed
- Written work does not answer the question or answers only part of the question despite verbally stating a full response.
- Repeats self in written work (in an open ended writing prompt type of task)

AT Written Productivity Evaluation Process

Data gathering - Students' Abilities
- Physical
- Visual Perceptual
- Sensory Processing
- Social emotional
- Cognitive
- Organization
- Vision/hearing/tactile....

Environmental Considerations
- Student to adult position
- Teacher expectations
- Amount of supervision/support
- Number/type of settings where skill is needed
- Lighting/Noise/Clutter
- Physical accessibility
AT Written Productivity Evaluation Process

Writing Task Expectations
- Amount of writing
- Expected time to complete writing
- Structure of tasks
- Reading requirements
- Format for writing

Basic Components of an Assessment of Written Productivity
- Evaluate work samples from class
- Observe the student in class while writing
- Alphabet knowledge and formation
- Timed copy task (near and far)
- Writing from dictation
- Writing when composing
AT Written Productivity Evaluation Process: Feature Matching

Think in terms of a flow chart or “decision tree” that summarizes the range of possibilities to consider. Flexibility is paramount, and initial strategies can be tried, abandoned, or modified as the Client’s needs change.

Two primary “branches” for consideration:

• Does the client present with a physical and/or sensory (e.g., visual) issue that impedes writing?
• Does the client present with a learning, language, and/or cognitive issue that impedes writing?

Assessment of Written Productivity

Has physical or sensory issue and cannot write well

Consider keyboarding rather than handwriting
Consider alternate/custom access to computer

Has learning, language or cognitive issue and cannot write well

Consider keyboarding rather than handwriting
Consider visual supports and graphics
Consider teaching supports

Consider word prediction
Consider Spell-check and read-back options
Consider word recognition
Consider Apps
Assessment of Written Productivity

DeCoste Writing Protocol

- Created by Denise DeCoste and available through Don Johnson
  - [http://donjohnston.com/decoste-writing-protocol/#.VLUjX8B032w](http://donjohnston.com/decoste-writing-protocol/#.VLUjX8B032w)

- Compares performance across handwriting and keyboarding tasks
- Examines spelling and writing performance
- Educators can make informed decisions about technology use
DeCoste Writing Protocol

Figure 1.9. Median WPM scores. (Barrett, Henderson, Scheib and Schulz, 2009, p.73)

<table>
<thead>
<tr>
<th>Age</th>
<th>Copy Best Median WPM</th>
<th>Copy/Txt Median WPM</th>
<th>True Write Median WPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>12.00</td>
<td>16.50</td>
<td>12.40</td>
</tr>
<tr>
<td>10</td>
<td>13.75</td>
<td>16.50</td>
<td>13.40</td>
</tr>
<tr>
<td>11</td>
<td>16.50</td>
<td>24.00</td>
<td>17.30</td>
</tr>
<tr>
<td>12</td>
<td>18.50</td>
<td>24.00</td>
<td>18.60</td>
</tr>
<tr>
<td>13</td>
<td>20.00</td>
<td>27.30</td>
<td>20.30</td>
</tr>
<tr>
<td>14</td>
<td>21.00</td>
<td>24.90</td>
<td>20.70</td>
</tr>
<tr>
<td>15</td>
<td>22.25</td>
<td>28.00</td>
<td>22.50</td>
</tr>
<tr>
<td>16</td>
<td>22.00</td>
<td>31.00</td>
<td>28.60</td>
</tr>
</tbody>
</table>

Figure 1.14. Mean adjusted LPN and WPM for repeated sentence copying task (Connolly, Gee, and Walsh, 2007).

<table>
<thead>
<tr>
<th>Grade</th>
<th>Handwriting LPN (WPM)</th>
<th>Keyboarding LPN (WPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16 (5.3)</td>
<td>7 (24)</td>
</tr>
<tr>
<td>2</td>
<td>33 (6.4)</td>
<td>172 (24.2)</td>
</tr>
<tr>
<td>3</td>
<td>53 (6.4)</td>
<td>135 (24.2)</td>
</tr>
<tr>
<td>4</td>
<td>80 (7.4)</td>
<td>284 (24.8)</td>
</tr>
<tr>
<td>5</td>
<td>107 (7.4)</td>
<td>376 (24.6)</td>
</tr>
<tr>
<td>6</td>
<td>140 (7.4)</td>
<td>475 (24.8)</td>
</tr>
</tbody>
</table>

• DWP is grounded in evidence and includes normative references

DeCoste Writing Protocol

Figure 2.1.

<table>
<thead>
<tr>
<th>DeCoste Writing Protocol Task</th>
<th>Purpose of Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphabet</td>
<td>A timed orthographic motor integration task</td>
</tr>
<tr>
<td>Best Sentence Copy</td>
<td>A timed straightforward visual-motor copying task that required fewer cognitive demands because a model of each word is provided</td>
</tr>
<tr>
<td>Dictated Sentence</td>
<td>Adds the element of spelling to the timed writing task</td>
</tr>
<tr>
<td>Fast Sentence Copy</td>
<td>Allows you to compare straight copying against a timed copying task that requires writing speed</td>
</tr>
<tr>
<td>Composed Text</td>
<td>Adds the element of generative writing to a timed writing task</td>
</tr>
<tr>
<td>Spelling List</td>
<td>Allows you to analyze linguistic knowledge</td>
</tr>
<tr>
<td>Extended Writing</td>
<td>Allows you to examine writing skills for a longer compositional task</td>
</tr>
</tbody>
</table>
DeCoste Writing Protocol

Step 1: Timed Handwriting
The student:
- Handwrites the alphabet from memory for 1 minute.
- Handwrites a copied sentence for 1 minute.
- Handwrites a sentence from dictation for 1 minute.
- Handwrites a copied sentence quickly for 1 minute.
- Composes and handwrites text, measured in one minute intervals.
- Indicates on a Likert scale his or her feelings about handwriting.

Step 2: Timed Keyboarding
The student:
- Keyboards the alphabet from memory for 1 minute.
- Keyboards a copied sentence for 1 minute.
- Keyboards a sentence from dictation for one minute.
- Keyboards a copied sentence quickly for 1 minute.
- Composes and keyboards text, measured in one minute intervals.
- Indicates on a Likert scale his or her feelings about keyboarding.

DeCoste Writing Protocol

Step 3: Spelling Word List
The student:
- Uses a keyboard to spell words dictated by an adult. If the student is unfamiliar with the keyboard, then the student can use handwriting.
- Indicates on the Likert scale his or her feelings about spelling abilities.

Step 4: Extended Writing
To examine writing ability, the student:
- Uses a graphic web to preplan what he or she will write.
A summary of what the current evidence tells us about instructional handwriting interventions:

- Manuscript is easier than cursive for young writers.
- Fluency of handwriting is key, whether it is manuscript, cursive or a combination.
- Handwriting instruction should focus on letters similar in formation, but learning the names of each letter is also essential.
- Fine motor training influences letter formation, but not automaticity or fluency.
- Orthographic-motor integration shows gradual improvement well into the secondary grades.
- Handwriting speed develops over time as a consequence of writing connected text, not just repeatedly copying letters in isolation.
- Interventions of less than 20 sessions that do not include direct handwriting practice are ineffective.
- A combination of visual cues, plus writing letters from memory, plus composing were found to be more effective than copying and imitating adult modeling to improve handwriting legibility, automaticity and productivity.
- Individual and small group direct instruction on letter formation along with activities to promote speed and accuracy can improve handwriting and written expression.
- Handwriting instruction focusing on accuracy and fluency when writing and naming letters of the alphabet, and copying connected text led to greater gains in compositional fluency, but not in overall story quality.

Common AT Software Supports for the challenged writer

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoWriter, Word Q</td>
<td>Word Prediction Software</td>
</tr>
<tr>
<td>Clicker 5/PixWriter</td>
<td>Picture Supported Writing Software</td>
</tr>
<tr>
<td>WYNN / Kurzweil</td>
<td>Optical Character Recognition/Electronic Study Aids</td>
</tr>
<tr>
<td>Read Out Loud</td>
<td>Text To Speech</td>
</tr>
<tr>
<td>Dragon Naturally Speaking</td>
<td>Speech to Text</td>
</tr>
<tr>
<td>Kidspiration, Inspiration, Draft Builder</td>
<td>Graphic Organizers/Concept Mapping</td>
</tr>
<tr>
<td>Classroom Suite</td>
<td>Switch Accessible Program for Academics</td>
</tr>
</tbody>
</table>
Word Prediction

• **Word prediction** 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.

Word Prediction

• It is also used for students who are poor spellers (all they need is the first one or two letters in the word) and students who have fine motor difficulties and type slowly (generally less that about 10 words-per-minute).
  • Word prediction programs often slow the computer/processor some and the lag may frustrate more expert users.
Assessment of Written Productivity

Has physical or sensory issue and cannot write well
- Consider keyboarding rather than handwriting
- Consider alternate/custom access to computer
- Consider word prediction

Has learning, language or cognitive issue and cannot write well
- Consider keyboarding rather than handwriting
- Consider visual supports and graphics
- Consider teaching supports
- Consider spell-check and read-back options
- Consider apps
- Consider speech recognition *
- Consider word prediction

*Speech recognition is usually not the only access option

Why to use word prediction programs?

- A word prediction program provides assistance to students who have difficulty writing by predicting the target word as the student types in the first letter or letters of the word.

- Word prediction programs provide rate enhancement for students who are slow typists due to physical disabilities or due to inexperience with typing as it reduces the number of keystrokes needed for each word.
Word prediction is available on many platforms

**Built-in word prediction:** Basic, free word prediction is built into almost every device. This includes iOS and Android mobile devices, Windows tablets and Chromebooks. The technology is also available in the Windows 10 and macOS operating systems.

**Word prediction apps:** You can download many word prediction apps on smartphones and digital tablets. Sometimes, the technology is part of a word processor application. Examples include iWordQ and Spell Better. Or it may be included as part of an onscreen keyboard, like Co:Writer Universal, Read&Write or Dyslexia Keyboard.

**Chrome tools:** Chrome has several tools called extensions and apps with word prediction. Co:Writer Universal and WordQ are examples.

**Word prediction software programs:** There are several literacy software programs for desktop and laptop computers. They offer word prediction in addition to other reading and writing tools. Examples include Co:Writer, Clicker 7, Kurzweil 3000, and Ghotit Real Writer & Reader.

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**Assessment of Written Productivity**

Has physical or sensory issue and cannot write well

- Consider keyboarding rather than handwriting
- Consider alternate/custom access to computer

Has learning, language or cognitive issue and cannot write well

- Consider Speech Recognition
- Consider keyboarding rather than handwriting
- Consider visual supports and graphics
- Consider teaching supports

Offers options when both types of problems are present

- Consider word prediction
- Consider Spell-check and read-back options
- Consider Apps
Aspects of Word Prediction

1. Word Completion
You’ll find this in MANY applications including phones.

If you begin to type, for example, the date “j-a-n-u,” the application predicts January DD, YYYY (the current date).

Aspects of Word Prediction

2. Auto-correction
You’ll find this in MANY applications including phones.

Auto-Correction uses your keyboard dictionary to spellcheck words as you type, automatically correcting misspelled words for you.
Aspects of Word Prediction

3. Prediction Patterns

The most common of these are Bigram/Trigram Prediction (patterns). This type of prediction utilizes two and three word patterns, and the frequency in which those two or three words appear together.

There are 3 key issues with regard to Bigram/Trigram Word Prediction:

1. The effectiveness of the pattern prediction hinges completely on the types of text the developers have used to analyze word patterns in general. If you search online you will word prediction and transcription programs targeted at particular audiences [lawyers, medical doctors...].
   • In these cases developers have used such common mediums to the target groups and the vocabulary and word patterns would not support the needs of a beginning writer.

2. This prediction is not effective when new words or topic words are entered because Pattern Prediction is dependent on the word patterns established by analyzing other writing. This type of prediction only becomes effective after repeated use.
   • The impact on the student is that correct predictions do not occur efficiently because the software needs to monitor the word usage to establish proper prediction. For a struggling writer, if the word is not predicted properly it will not be used as frequently.

3. New words entered need to contain all forms of the word to be predicted correctly because prediction is not based on grammar and root words. This requires you to enter every form of any given word. For example, if the word explore was not in the dictionary, the word would need to be entered multiple times: explore, explores, explored, exploring, explorer for prediction to occur for all forms of the word. Consequently, a struggling writer would only be presented with that form of the word that was entered.
Aspects of Word Prediction

3. Prediction Patterns

Linguistic Prediction

Based on linguistic features of language rather than context based use. The software dictionary knows the grammatical value of each word in its dictionaries.

Using a grammar-based intelligence, the program can accurately predict words within the framework of valid sentence structures.

It also gives flexibility to the words it learns by automatically predicting in multiple tenses and usages.

Co-Writer (Linguistic Prediction)
Co-Writer: Critical Features

Grammar Usage and Dictionaries
- There are five main dictionaries to choose from within Co-Writer SOLO.
  - A main dictionary is selected based on the writer’s ability level and provides appropriately levelled word choices that help the student build good first sentences.
  - Co-Writer SOLO automatically collects and assigns grammar to most new and learned words.

Topic Dictionaries
- Topic Dictionaries are lists of words grouped together by a specific topic or content area. Rather than laboring over how to spell Pterodactyl or Tyrannosaurus, students can focus on writing for meaning and retelling their knowledge.
  - Applying a Topic Dictionary increases students’ efficiency by getting to content-specific words in just one or two keystrokes.
  - Over 140 Topic Dictionaries are included in Co-Writer SOLO.

Phonetic Spelling
- Co-Writer’s FlexSpell provides every conceivable letter-pattern students will try in an attempt to spell-out words.
  - FlexSpell can be adjusted to work after just one letter is typed, for example if a student types the letter “u” Co-Writer SOLO will predict the word “you”, or FlexSpell can be set to provide phonetic spellings only after two or three letters have been typed.

Co:Writer Feature: Monitoring Student’s Use

1. After logging into educatordashboard.com click on the orange Monitor tab on the main screen.
2. Then click on Co:Writer under accommodations.
3. Click on Reports.
Co:Writer Feature: Reports

- **Shows when the student was initially given access to the software.**
- **Total number of words typed since initial date.**
- **Co:Writer tracks time when the word prediction box is present. When idle for 5 or more minutes, tracking stops.**

**Word Types**

- **Academic Words:** 19
- **Transition Words:** 5
- **Important Words:** 25

Co:Writer tracks the use of academic words, transition words, and number of important words. This allows you to track your students’ mastery of vocabulary within their writing.

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Co:Writer Features: Usage of Vocabulary

### Important Words

<table>
<thead>
<tr>
<th>Words Used</th>
<th>Words Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>be</td>
<td>right</td>
</tr>
<tr>
<td>cause</td>
<td>say</td>
</tr>
<tr>
<td>change</td>
<td>science</td>
</tr>
<tr>
<td>different</td>
<td>see</td>
</tr>
<tr>
<td>do</td>
<td>thought</td>
</tr>
<tr>
<td>end</td>
<td>use</td>
</tr>
<tr>
<td>get</td>
<td>work</td>
</tr>
<tr>
<td>good</td>
<td></td>
</tr>
<tr>
<td>happy</td>
<td></td>
</tr>
</tbody>
</table>

**Words Used:**

This shows a list of words that have been used by your student in their writings.

When you click on the "Words Not Used" you will see a comprehensive list of words that fall into the category that have not been used by your student.

Teachers can use this information create mini lessons that will help broaden their student’s vocabulary usage.
WordQ 5 (Bigram Prediction ?)

- **WordQ 5** offers word prediction, speech feedback, proofreading, enhanced topical web searches
- WordQ **PDF** is an application within WordQ 5 that allows students to open PDF documents for accessible reading and writing.
  - In addition to general reading of a PDF document, students can fill out forms, and complete assignments and tests that are provided in PDF format with the full functionality of WordQ working for them.
WordQ 5 Critical Features

- **WordQ PDF** includes an application that allows students to open PDF documents for accessible reading and writing.
  - In addition to general reading of a PDF document, students can fill out forms, and complete assignments and tests that are provided in PDF format with the full functionality of WordQ working for them.
- By intentional design, with input from seasoned educators, WordQ does not write for students nor fix all their mistakes.
- High-quality speech feedback allows students to hear what they write in a clear and pleasant voice to immediately capture mistakes independently.
- Proofreading mode guides students to readily find and correct spelling and grammar mistakes.
- ThoughtQ technology integrates Dynamic topics to help students research and write about an unfamiliar topic.

Who should use a word prediction program?

Students/Clients who:

- Do not get enough support from standard word processors.
- Have a basic knowledge of letter/sound associations.
- Struggle to get their ideas down on paper due to sensorimotor issues.
- Fatigue easily when writing due to the effort required by the physical act of handwriting.
- Have writing that is difficult to read due to spacing, letter reversals, misspelled words, and letter formation.
- Use less sophisticated vocabulary in their writing due to difficulty in spelling.
- Require extended time to complete written work when compared to grade level peers.
Multifunction Software

Co-Writer and Speech Recognition
Clicker 7

- Clicker 7 is a multimedia literacy support tool designed to meet a wide variety of students’ needs.
- It features a talking word processor, word prediction, illustration and paint tools, and access to activities and templates.
- Word, picture or sentence sets are a popular feature for scaffolding student writing in this program.
**Key Elements of an AT Implementation Plan [part 1]**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who will collaborate in the development of the implementation plan?</td>
<td></td>
</tr>
<tr>
<td>What specific goals and tasks will be addressed in the plan?</td>
<td></td>
</tr>
<tr>
<td>What aspects of the student’s performance are expected to change (e.g., reduced time, increased accuracy, quantity, quality, engagement)?</td>
<td></td>
</tr>
<tr>
<td>How will AT be integrated into the curriculum and daily activities across environments?</td>
<td></td>
</tr>
<tr>
<td>What tools and strategies will be used to accomplish identified task(s)?</td>
<td></td>
</tr>
<tr>
<td>What evidence/data will be needed to determine which tools and strategies are most effective for particular environments and tasks?</td>
<td></td>
</tr>
</tbody>
</table>

**Key Elements of an AT Implementation Plan [Part 2]**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will performance evidence/data be measured and collected?</td>
<td></td>
</tr>
<tr>
<td>When will the performance evidence/data be reviewed to determine what changes, if any, are needed in the implementation plan?</td>
<td></td>
</tr>
<tr>
<td>What do team members need to do for successful implementation to take place?</td>
<td></td>
</tr>
<tr>
<td>Which team members will share responsibility for each action that needs to be taken (e.g., staff, family, supporters, student)?</td>
<td></td>
</tr>
<tr>
<td>What initial and ongoing learning opportunities will be provided for all team members, including the student?</td>
<td></td>
</tr>
<tr>
<td>How will equipment and materials be managed and maintained?</td>
<td></td>
</tr>
</tbody>
</table>
Anne Cronin,
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• acronin@hsc.wvu.edu

Link to handouts