SWAAAC Evidence-Based Practice

Word Prediction for Students with Disabilities

The following is a collection of peer-reviewed journal articles addressing the effects and the use of word prediction to increase written productivity for students with disabilities. The intent of this document is to provide some foundational information for the implementation of evidence-based practice. Please contact the SWAAAC office if you would like to add an article to the this resource.

**This document contains a variety of resources including, but not limited to peer-reviewed journal articles, magazine articles, academic papers, and conference proceedings. It is the responsibility of the reader to evaluate the sources and use their best judgment with regard to EBP applications.*

Common Themes in the Research

- When using a word processor with word prediction, there is an increase in productivity/ length of writing and legibility of writing
- Word prediction improves spelling, composition of writing and a broader range of vocabulary words used.
- Word prediction alone and in combination with text-to-speech had a positive impact on participants' writing.

Technology supporting written productivity in children with learning disabilities: A critical review
-Beata Batorowicz, Cheryl A. Missiuna, Nancy A. Pollock
Abstract: Background. Occupational therapists working with school-aged children are often in the position of recommending technology to enhance written productivity. The outcome of using technology on the writing of children with learning disabilities has not been reviewed critically, and this knowledge is necessary for evidence- based practice. Purpose. To review evidence regarding the use of technology to support written productivity in children with learning disabilities. Methods. A systematic search of seven databases, plus a manual search, retrieved 864 papers published between 1985 and March 2012. Twenty-seven papers (28 studies) met inclusion criteria. Findings. The evidence is of a moderately low level and results are inconclusive; however, trends suggest a positive influence of some technology on children's performance and behavior. Methodological limitations exist in most studies and the description of specific technology intervention is often combined with teaching instructions. Implications. The available research is encouraging, but high-quality investigations with newer technologies are needed. (Batorowicz, Missiuna, & Pollock, 2011)

The Impact of Word Prediction Software on the Written Output of Students with Physical Disabilities
-Pat Mirenda, Kirsten Turoldo
Abstract: This study examined the impact of a word prediction software program, Co:Writer, on the written output of 24 students with physical disabilities that affected their ability to write by hand. Surveys were completed by both students

who used Co:Writer and their teachers/adult supporters in schools, and 10-minute writing samples were obtained from students in three modalities: handwriting, word processing, and word processing with Co:Writer. Two-thirds or more of the students and 50% or more of the adults believed that Co:Writer helped the students to spell better; use a wider variety of words; write faster; produce neater, easier-to- read work; and write more correct sentences. Further, two-thirds or more of the adults and 50% or more of the students believed that Co:Writer helped the students to write more without tiring, experience less frustration when writing, and read what they had written. The writing sample analyses indicated no significant difference between the three writing modes with regard to the total number of words produced in 10 minutes. However, word processing and/or Co:Writer resulted in higher percentages of legible words, correctly spelled words, and correct word sequences; and in longer mean lengths of consecutive correct word sequences than handwriting. The results are discussed in terms of their relevance to educational technology supports for students with physical disabilities. (Mirenda & Turoldo, 2006)

The Effects of Word Prediction and Text-to-Speech Technologies on the Narrative Writing Skills of Hispanic Students with Specific Learning Disabilities

-Monica C. Silió, Patricia M. Barbetta

Abstract: A multiple-baseline design across subjects was used to investigate the effects of word prediction and text- to-speech alone and in combination on four narrative composition-writing skills (writing fluency, syntax, spelling accuracy, and overall organization) of six fifth-grade Hispanic boys with specific learning disabili- ties (SLD). Participants were divided randomly and equally into Cohorts A and B. During baseline, both co- horts wrote for 15-minute sessions using word processing only. During intervention. Cohort A participants used word prediction, and then word prediction with text-to-speech. Concurrently, Cohort B participants used text-to-speech followed by text-to-speech with word prediction. The results indicated that word predic- tion alone or in combination with text-to-speech had a positive effect on the narrative composition-writing skills of the targeted students. With text-to-speech alone, inconsequential results were observed. (Silió & Barbetta, 2010)

The Effects of Word Completion and Word Prediction on Typing Rates Using On-Screen Keyboards

-Dennis Anson, Penni Moist, Mary Przywara, Heather Wells, Heather Saylor, Hantz Maxime

Abstract: Word prediction is often recommended by therapists as a means to improve typing speed for clients with physical limitations. Although literature suggests that word prediction does have an effect on writing proficiency, increased speed is not one of its benefits when used with a standard keyboard. One reason given for the failure of word prediction to accelerate typing is that the user must look away from any source document to scan the prediction list during typing. Looking away from the source document may slow the typist more than any acceleration offered by word prediction. For input methods that already require the typist to look away from the copy, this effect might be irrelevant. The focus of this research was to determine whether word completion or word prediction pro- grams would increase typing speed when used with an input method (an on-screen keyboard) that also re- quires looking away from the source document. Ten people, five men and five women, aged 20 to 38 years, participated in this study. The study used a single-subject, successive intervention design to test typing speed and accuracy using an on-screen keyboard with integrated word prediction software. Seven participants had their fastest typing speed with word prediction. Two participants had their fastest typing speed with word completion. Only one participant demonstrated no improvement in speed when using these two pro- grams. Overall, these results show that the use of word prediction and word completion may assist on-screen keyboard users to improve typing speed. (Anson, et al., 2006)

Facilitating Written Work Using Computer Word Processing and Word Prediction

-Dottie Handley-More, Jean Deitz, Felix F. Billingsley, Truman E. Coggins

Abstract: The purpose of this study was to investigate whether occupational therapy intervention that focused on teaching children to use word processing, either alone or with word prediction, was effective in improving the written communication skills of children with learning disabilities and handwriting problems. A single-subject

alternating treatments design was replicated across three children in grades 4 and 5. During the baseline phase the children wrote stories by hand; during the intervention phase, the children wrote stories, alternating among handwriting, word processing, and word processing with word prediction. Dependent variables focused on percentages of legible words, percentages of correctly spelled words, total amount written, and rate of writing. Data were analyzed by visual inspection. Results were variable. Two children had clear improvements in legibility when using either word processing alone or with word prediction. These same children demonstrated clear improvements in spelling when using word prediction. Though rate of writing was best for two children when using handwriting, relative to total amount produced, one method was not clearly preferable to another. Occupational therapy intervention involving word processing with word prediction improves the legibility and spelling of written assignments completed by some children with learning disabilities and handwriting difficulties. It is important to evaluate each child individually and provide training and ongoing support for technology use. (Handley-More, Deitz, Billingsley, & Coggins, 2003)

Word Prediction Programs with Phonetic Spelling Support: Performance Comparisons and Impact on Journal Writing for Students with Writing Difficulties

-Anna S. Evmenova, Heidi J. Graff, Marci Kinas Jerome, Michael M. Behrmann

Abstract: This investigation examined the effects of currently available word prediction software programs that support phonetic/inventive spelling on the quality of journal writing by six students with severe writing and/or spelling difficulties in grades three through six during a month- long summer writing program. A changing conditions single-subject research design was used and replicated across the participants. Using a daily writing prompt, students alternated between *Co:Writer*, *WordQ*, and *WriteAssist* word prediction programs. The results provided evidence for the effectiveness of various word prediction programs over word processing and demonstrated improvements in spelling accuracy across conditions. Relative gains in the total number of words and composition rate were modest for the majority of the participants and should be interpreted with caution due to several methodological issues. The social validity interviews revealed that all students enjoyed the word prediction programs and found them beneficial. Study limitations and recommendations for future research are discussed. (Evmenova, Graff, Jerome, & Behrmann, 2019)

The Effects of Word Prediction on Communication Rate for AAC

-Keith Trnka, Debra Yarrington, John McCaw, Kathleen F, McCoy, Christopher Pennington

Abstract: Individuals using an Augmentative Communication (AAC) device communicate at less than 10% of the speed of “traditional” speech, large communication gap. In this user study, we compare the communication rate of pseudo-impaired individuals using two different word prediction algorithms and a system without word prediction. Our results show that word prediction can increase AAC communication rate and that more accurate predictions significantly improve communication rate. (Trnka, Yarrington, McCaw, McCoy, & Pennington, 2007)

Using Software to Enhance the Writing Skills of Students with Special Needs

-Jennifer Cullen, Stephen B. Richards, Catherine Lawless Frank

Abstract: This study used a modified multiple-baseline design to determine the effects on the writing performance of seven students with special needs when a talking word processor with spell checker software was used independent of and in conjunction with word prediction software as accommodations in daily writing exercises. Results indicated that, in general, the impact of using writing software was positive. The group mean for number of misspellings decreased, accuracy percentage increased, number of words increased, and overall district writing rubric scores increased. Further, the software had different benefits for different students and students expressed preferences for particular software functions. Implications for practice and research are presented. (Cullen, Richards, & Lawless Frank, 2008)

Measuring the outcomes of word cueing technology

-Cynthia Tam, Janice Archer, Jennifer Mays, Gretchen Skidmore

Abstract: Background. Measurement of assistive technology outcomes is complex because many factors (e.g., environment and model of service delivery) influence the successful use of the technology. Purpose. Using the example

of measuring the outcomes of word cueing technology, this paper presents an approach for measuring assistive technology outcomes. Method. The Canadian Occupational Performance Measure (COPM) was administered to 29 children with physical and learning disabilities, between the ages of 3.9 and 19 years. Participants were provided with WordQ, a software program designed to assist the development of writing skills. Follow-up data were collected through telephone interviews. Results. The COPM findings supported the effectiveness of WordQ Version 1 to enhance written productivity, with a mean performance change score of 3.5 (SD = 1.5).The COPM was an effective tool for measuring clients' perceived outcome of word cueing technology. Telephone interview was considered a successful method for collecting outcome data.Practice Implications. A mix of tools and methodologies should be used to gain a comprehensive understanding of the impact of assistive technology. (Tam, Archer, Mays, & Skidmore, 2005)

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