

**Lynn Schultz**

**Linda Miller-Dunleavy**

**Old Dominion University**

**Norfolk, VA**

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## **Abstract**

### **Using Technology to Improve the Writing by of Students with Special Needs**

The enigma of our students who do not have mental retardation but who have severe academic problems has often led us to seek quick-and-easy “miracle” cures. These students are often identified as having learning disabilities. Special educators recognize that a learning disability is a lifelong condition and that these students need to be taught learning strategies that instruct them “how to learn”. An area of concern, nationwide and in Virginia, for students with learning disabilities is writing. The considerable research in computer-assisted writing shows an improvement in both the content and readability of a student’s composition. However, there is a significant need in the field of special education to further study the overall process of using assistive technology tools to increase the independence and pride in the academic work of students with learning disabilities.

Beginning in spring 2000, Linda Miller-Dunleavy and Lynn Schultz, of Old Dominion University, (ODU), began work to develop teaching strategies using technology to improve the writing of students with special needs. The enigma of our students who do not have mental retardation but who have severe academic problems has often led us to seek for quick-and-easy “miracle” cures. These students are often identified as having learning disabilities. Special educators recognize that a learning disability is a lifelong condition and that these students need to be taught learning strategies that instruct them “how to learn”. An area of concern, nationwide and in Virginia, for students with learning disabilities is writing. The considerable research in computer-assisted writing shows an improvement in both the content and readability of a student’s composition. However, there is a significant need in the field of special education to further study the overall process of using assistive technology tools to increase the independence and pride in the academic work of students with learning disabilities. The authors’ extensive and varied teaching experiences, and their work in technology, suggested that combining computer-based applications for writing and editing with established instructional writing strategies, would improve the writing of students with learning disabilities.

This ongoing study supports the efforts of Virginia's school divisions to improve Standards of Learning (SOL) writing scores for the special needs population. Utilization of strategy-based instruction for individuals with learning disabilities has been researched for many years and it has been suggested that students benefit when “Strategy Instruction” is integrated with word processing (The University of Kansas Center for Research on Learning, <http://www.ku-crl.org/iei/index.html>). This study implemented

specific learning strategies POWER and TRACK [see figure 1] to improve both quality and quantity of student's writing. An additional goal was to utilize the Learning How to Write research based strategy-instruction guidelines to increase mastery of SOL's with identified students (The University of Kansas Center for Research on Learning, <http://www.ku-crl.org/iei/index.html>). The study began as a one year project working with selected middle and high school special educators from Chesapeake Public Schools, Chesapeake, VA (CPS). Using identified instructional strategies and computers located within the school, students wrote and edited using Microsoft Word rather than pencil and paper. Samples from each student were collected in September and May, and classroom observations were conducted by the authors. This stage of the study, referred to as Phase I, was extended a second year, lasting from School Years 2000-2001 to 2001-2002. By spring 2002, the authors and participants felt it was time to move the study to a higher level. All participants felt that positive changes were taking place, but not enough to create meaningful changes in writing scores. Participants felt that the program must incorporate frequent and sustained use of writing using computers, as well as a more formalized approach to writing instruction. After meeting with Directors from Special Education and the English Department from CPS during the summer 2002, this new approach was embraced by all and is now awaiting implementation as Phase II.

The Chesapeake Public School system was selected to pilot and field-test the project starting in Summer 2000. The teacher-participants included 11 special education teachers from this system. Ten of the participants are located in middle schools, which serve grades 6 – 8, and the eleventh participant teaches high school. Eight of the middle school teachers have classes for students with learning disabilities that are taught either in

self-contained or resource classrooms. The remaining two middle school teachers teach either students with emotional disorders or a mixed classroom of students with emotional disorders and those with learning disabilities. The high school teacher teaches resource students with learning disabilities.

Beginning Spring 2000, ODU personnel and CPS teachers conducted several planning sessions to develop a plan of action. The team developed ways to use Tracking Changes in the classroom, and shared writing strategies that assisted their special needs population through the difficult writing process. Tracking Changes is a rarely used tool imbedded in Word that allows editing marks to be entered on any Word document. While this is a business feature, the authors and participants have developed several strategies for using Tracking Changes specific to the education setting [see figure 1].

During the summer 2000 workshop, directions for using Tracking Changes during writing instruction were created and field-tested. A rubric was created and revised to evaluate different aspects of the writing process. The importance of selecting specific strategies based upon “best practices” for writing was highlighted during the first workshop. A specific learning strategy, **POWER (Plan, Organize, Write, Edit, Revise)**, was selected. Teachers selected different approaches for the **Plan** and **Organize** stage of **POWER** based upon their classroom needs, and all teachers used Tracking Changes for the **Write, Edit** and **Revise** stages [see figure 1].

<b>P</b> lan	<b>T</b> urn off tracking
<b>O</b> rganize	<b>R</b> eview all comments
<b>W</b> rite	<b>A</b> dd words
<b>E</b> dit	<b>C</b> lear Comments
<b>R</b> evise	<b>K</b> nock out all lines

**Figure 1**

During the academic year 2000-2001, three dinner meetings were held with participating teachers for reflection, encouragement, and problem-solving, and each teacher was observed in their school setting at least once during the year. The project leaders felt this to be an invaluable part of the experience, for without periodic support and reflection this would become just another summer workshop. Writing samples for all students involved in the study were collected in September and May. Using the writing rubric created by the participants, these samples were assessed independently by the authors and two graduate students.

In the preliminary findings [see Table 1] of Phase 1, the authors hoped to improve both quality and quantity of the writing processes and produce significant gains in outcome-based results for these students. Improvement was measured by scores on the writing rubric, with the ultimate achievement to result in an increase in mastery of Virginia's Writing Standards of Learning (SOL). Data show a significant gain in 7 out of the 11 areas of the writing rubric. These seven areas represent the mechanics of writing. It was felt that the use of the computer and editing features increased student scores. Of

the 4 areas not showing improvement, it is the opinion of the team members that writing strategies for Plan and Organize need to be improved and emphasized. This became the focus for year two of the study (school year 2001-2002).

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Sample - Post Sample	-.57	1.01	.13	-.83	-.32	-4.484	62	.000
Pair 2	Pre Paragraph - Post Paragraph	-.57	.61	7.74E-02	-.73	-.42	-7.378	62	.000
Pair 3	Pre sentence Structure - Post Sentence Structure	-.30	.73	9.23E-02	-.49	-.12	-3.268	62	.002
Pair 4	Pre Capitalization - Post Capitalization	.35	3.78	.48	-.60	1.30	.734	62	.466
Pair 5	Pre Complete Thought - Post Complete Thought	3.17E-02	.92	.12	-.20	.26	.275	62	.784
Pair 6	Pre Punctuation - Post Punctuation	1.59E-02	1.02	.13	-.24	.27	.123	62	.902
Pair 7	Pre Spelling - Post Spelling	-.30	.82	.10	-.51	-9.61E-02	-2.934	62	.005
Pair 8	Pre Central Idea - Post Central Idea	.14	.98	.12	-.10	.39	1.155	62	.252
Pair 9	Pre Word Count - Post Word Count	-.70	.75	9.50E-02	-.89	-.51	-7.350	62	.000
Pair 10	Pre Grammer - Post Grammer	-5.45E-02	.76	.10	-.26	.15	-.535	54	.595
Pair 11	Pre Descriptive Detail - Post Descriptive Detail	-.67	.94	.13	-.93	-.42	-5.286	54	.000

**Table 1**

Seven of the original eleven teachers elected to remain with the project for another year. Four new teachers were selected, all working at the middle school level in Learning Disability resource or self-contained classrooms. Meeting again during the summer of 2001, participants and the authors worked to refine the grading rubric and share successful writing instructional strategies. During school year 2001-2002, teachers collected a September writing sample, which was graded using the rubric from the previous year. Dinner meetings and school observations were also continued. A new tool was discussed for possible inclusion in the project, text-to speech editors (a built in

component in Word XP). Most of the participants, and authors, noticed that when text was READ to students many mistakes in syntax and grammar were suddenly evident to the student. During these meetings in the winter of 2002 it became evident that computer time allocated to these teachers for this project was being seriously eroded. It was during this time frame that computer software developed to help students with their Standards of Learning (SOL) tests was being installed and in heavy demand at the participant's schools. Therefore, the needed time to complete the writing in the computer labs was in jeopardy. After the authors met with the administration at the schools to discuss solutions, it was felt that the situation was beyond our control. Sadly, we were not able to complete the final writing project with a majority of the participants that year.

During the spring 2002 semester evaluation and research results brought about some needed redirection. The group of CPS Special Education teachers who participated in this study was asked for feedback in May. They felt that this approach was helpful, but did not offer enough writing time to realize the desired outcome of passing the 8<sup>th</sup> grade writing SOL. Participants recommended inclusion of text to speech software. It was also their recommendation that CPS develop a pilot course to test this approach with one class that would focus on writing instruction using the computer daily. Evaluating the feedback from Phase 1, the authors realized that *major prerequisites* for the next phase were the consistent use of computers by the students to improve their writing, and a stronger emphasis on using established writing instructional strategies from the CPS' English department. In June 2002, the authors met with representatives of the Special Education and English Department from CPS to determine if there was interest in pursuing these recommendations. CPS administrators were very interested in the

approach, but felt that the English department needed more input into the process, in particular using existing writing strategies and the established writing rubric developed for the SOL exams. After much discussion, it was decided to initiate another pilot program with CPS during the 2002-2003 school year to answer the following question:

**“Do computer-based applications for pre-writing, writing and editing, in conjunction with established instructional writing strategies, improve the writing of students with learning disabilities?”**

This phase of the study will include the utilization of discrete methods of speech to text software to assist students with learning disabilities in monitoring their errors and providing immediate reinforcement and corrective feedback., as well as include graphic organizer software. MacArthur (1996) stated that students with LD need to focus on authoring rather than being hampered by the secretarial aspects of writing. He also noted that speech synthesis and word prediction software assist students with LD to focus on idea generation and think less about the mechanical transcription of their words into written language. This framework suggested the selection of ‘Write Out Loud’ as the speech to text software to be implemented in this next phase(<http://www.teachingld.org/> & <http://www.donjohnston.com/>). There is significant need in the field of special education to further study the overall process of using assistive technology tools to improve student learning and performance across grade levels, with diverse students, and in a broad range of content areas (Inspiration Software, Inc., 2003). Additional work in this area (The Institute for the Advancement of Research in Education, 2003) has focused on the use of word processing software as a means to facilitate a sequential approach to writing when used with an accompanying outlining software. It is this second perspective

that guides us in utilizing Kidspiration with our project. Kidspiration is a commercially produced software program that helps students in grades K-5 brainstorm ideas with pictures and words (Inspiration Software, Inc., 2003). Additionally, it assists students in the process of organizing and categorizing information visually to create stories and descriptions. The critical features of Kidspiration are that it contains an integrated graphic organizer and outline tool along with the added ability to use speech to text and text to speech in the writing process (The Institute for the Advancement of Research in Education, 2003). The last supporting piece of research states that graphic organizers have been found to be effective tools for helping students with disabilities organize and make connections with existing schemas. As a result students with learning disabilities had an increase in their ability to understand the writing process and consequently improve their writing skills (Gallick-Jackson, 1997; Meyer, 1995).

The research will be conducted in a different manner in Phase II. Using an experimental and control group of students with LD, prewriting samples will be collected and analyzed. Existing curriculum will be enhanced in the experimental group to include the technology components on a daily basis; classroom observations will be conducted by the authors; and reflective journals will be prepared by the classroom teachers. Standardized test scores of the two groups will be analyzed using accepted statistical tests.

Participants for the Phase II were identified by CPS; one elementary school self-contained Learning Disabled classroom as the experimental group, another comparable classroom in the same school as the control group, and a Language Arts Elementary Specialist to assist with instructional strategies.

Phase 2 of the project, slated to begin Fall 2002, was delayed due to a financial crisis in the state resulting in all grant funding frozen for an undetermined time. Eventually the monies were released in Spring 2003, and it was decided to postpone the project until the following school year. During the school year 2003-2004, initial meetings were held with the Language Arts Specialist to begin working on appropriate instructional strategies, and the necessary software was purchased and installed in the participating elementary school. However, due to other commitments for the authors during the 2003-2004 academic year, implementation of the project has been postponed until school year 2004-2005.

Several research perspectives were considered in formulating and revising the study. These perspectives are reinforced by the authors convincing belief that minimal requirements for improving writing achievement should be to provide effective writing instruction to **ALL** students and this **must** include students with learning disabilities. The first research perspective from De La Paz, Owen, Harris, & Graham (2000), is that students will not become better writers if they do not spend a substantial part of most school days engaged in productive writing activities. The second research perspective from Graves (1985), stated that students should write for at least 30 minutes a day, at least four days a week, as opposed to a national average of writing one day in eight. Since written expression is the most complex language arts skill, it is generally not stressed daily in instructional programs for students with special needs. Graves supported our prerequisite of consistency in the use of computers to write. Sufficient research also suggests that students benefit when strategy instruction is integrated with word processing (Tralli, Columbo, & Deshler, 1996). Continued support for the utility of

strategy-based instruction where teachers provide explicit direction in planning, writing and revising exists in agreement with research in computer-assisted writing that shows an improvement in both the content and readability of a student's composition (MacArthur, 1991). The authors' project now had empirical support based on the work of MacArthur, 1993, "Word processing alone does not lead to better revision unless instruction focuses on how to revise effectively."

Several additional factors are driving the current phase of this project. No Child Left Behind (P.L. 107-110) has given educators the responsibility of helping **all** students reach grade level standards without acknowledging that there are those who can not obtain access and success because of problems such as writing disabilities (Section 9101 of the No Child Left Behind Act (NCLB) of 2001, retrieved from <http://ldonline.org/>). It is imperative that to meet the NCLB goals we begin to use technology to support our special education students. The field of educational technology has many advantages for students with learning disabilities. Mastropieri, M. A., & Scruggs, T.E. (2000), stated that assistive technology provides individualized instruction and allows the student with learning disabilities to focus on specific skills as well as receive immediate feedback.

All of this leads the authors to declare that the ultimate purpose of this project must be to close the writing performance gap currently seen in a majority of the population of students with learning disabilities when compared to their age appropriate peers. The time has come to negate the research of DeCoste and Jacobs, 1999, who declared that students with disabilities receive qualitatively and quantitatively less literacy instruction and more time spent addressing reading than writing. In implementing Phase 2 of this project we can do our part in seeing the cycle of school failure for our students

with learning disabilities spiral upward in a positive direction. Perhaps the project can become the impetus in finding an answer to the dilemma created by the NCLB mandate regarding the increase of technology use in education. The onus of the responsibility belongs to all of us in education.

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