An Investigation of the Efficacy of an Editing Strategy with Postsecondary Individuals with Developmental Disabilities

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Abstract: This study examined the efficacy of the EDIT Strategy on proofreading skills of postsecondary individuals who attended a campus-based college program for students with developmental disabilities. A random assignment to treatment or control groups and a pre- and posttest with maintenance follow-up design were employed. The EDIT Strategy was taught through a multi-step mnemonic strategy to students in the treatment group. The instruction addressed essential proofreading skills including identifying and correcting spelling, punctuation, capitalization, overall appearance, and substance errors in electronic documents through the use of a computer and word processing tools. The posttest and maintenance data revealed a significant difference in favor of the treatment group when compared with the control group concerning the overall number of editing errors and the respective types of errors that were corrected. The results provide support for the efficacy of the EDIT Strategy for postsecondary learners with developmental disabilities.

The postsecondary landscape has dramatically changed for young adults with developmental disabilities. Over the past decade there has been an exponential increase in the type and number of educational opportunities available to individuals with developmental disabilities upon exiting high school (Griffin, Summer, McMillan, Day, & Hodapp, 2012; Papay & Bambara, 2011). With the passage of the Higher Education Opportunity Act of 2008, individuals who wish to enroll in a college program that provides support for individuals with developmental disabilities now have the opportunity to apply for federal funding (i.e., Pell grants).

These college-based postsecondary programs serve individuals with a heterogeneous

array of developmental disabilities (e.g., autism, Asperger's syndrome, intellectual disabilities, multiple disabilities) who have exited their K-12 educational settings with diverse personal profiles of strengths and areas of need. It is imperative that these postsecondary programs provide evidence-based instruction to ameliorate core academic skills in which individuals still experience difficulty. One core academic area that permeates across an individual's lifespan is written expression (MacArthur, Philippakos, Graham, & Harris, 2012).

McNaughton, Hughes, and Clark (1994; 1997) noted that proficient writing skills are an integral part of one's ability to fully participate in society. A survey of a sample of American corporations found that concise writing is considered by employers as an essential skill for a variety of vocations in fields such as service industries, finance, insurance, real estate, manufacturing, and construction (National Commission on Writing in America's Schools and Colleges, 2004). Educators in K-12 and postsecondary schools concur with employers that written expression is an important skill for students to obtain (National Commission on Writing in America's Schools and Colleges, 2003).

Despite universal agreement of the importance of written expression, the National Center for Education Statistics (NCES, 2012) indicated that only 24% of students in eighth- and twelfth- grades obtained a proficient level (i.e. students' clearly demonstrated skill) in the area of writing. One reason for the low level of proficiency on the NCES 2012 assessment may reflect the fact that written expression is a multifaceted construct. MacArthur, Schwarz, and Graham (1991) view writing as "a complex process that draws on an individual's knowledge, basic skills, cognitive strategies, and ability to coordinate cognitive processes" (p. 230). Hayes and Flower (1987) and Hayes (1996) described the writing processes as a cyclical practice that encompasses planning, sentence development, and revision.

Individuals with disabilities who experience difficulties in written expression often spend the majority of their cognitive skills on the basic mechanics of writing (e.g., creating content; finding and corrective errors in spelling and punctuation) which may interfere with their employment of effective strategies (e.g., developing text, revising beyond mechanics during the writing process (MacArthur, Graham, Schwartz, & Schafer, 1995; MacArthur et al., 1991; McNaughton et al., 1997). When editing and revising their own written products these learners often struggle with detecting and correcting the following types of errors: spelling, substance (e.g., not providing enough information), overall appearance of text (e.g., spacing, margins, neatness of work), capitalization, and punctuation (De La Paz, 1999; Dixon, 1991; Graham & Harris, 2009; MacArthur et al., 1991; McNaughton, Hughes, & Ofiesh, 1997; McNaughton et. al., 1997; Okolo, Cavalier, Ferretti, & MacArthur, 2000; Schumaker & Deshler; 2009).

The use of computers holds potential to aid students with disabilities in the mechanical (e.g., correcting grammatical errors) aspects of writing and revising (Cochran-Smith, 1991; MacArthur & Shneiderman, 1986; MacArthur et al., 1995, 2012; McNaughton et al., 1994, 1997). Computers have become a basic staple in many classrooms across the United States. The use of computers to construct written text allows for numerous iterations of the revision process without placing an undue burden on the writer (Cochran-Smith, 1991; MacArthur

et al., 1991, 2012). Researchers caution against promoting the employment of computers with individuals who struggle in constructing written text without the support of explicit instruction in writing strategies and computer use (Cochran-Smith, 1991; MacArthur et al., 1991, 2012; MacArthur & Shneiderman, 1986).

For young adults with developmental disabilities, who continue to experience challenges when revising and editing their written work, it is imperative that they receive effective strategy-based instruction. Effective strategy instruction within the area of written expression incorporates: (a) an assessment of prerequisite skills; (b) teacher-led demonstration of strategy steps; (c) guided practice that incorporates "think aloud" processes with error correction and feedback; and (d) independent practice until mastery is achieved (Archer & Hughes, 2010; Gersten & Baker, 2001; Graham, 2006; MacArthur et al., 1995; Schumaker & Deshler, 2009). Previous investigations have revealed that instruction which incorporates these core aspects of strategy instruction has been successful in increasing the writing proficiency for individuals with behavior disorders, Asperger's Disorder, intellectual disabilities, and learning disabilities (Delano, 2007; Graham & Harris, 2009; Hallenbeck, 2002; Harris, Graham, & Mason, 2003; Lane et al., 2008; Schumaker & Deshler, 2009; Wolgemuth, Cobb, & Alwell, 2008).

One strategy instruction program that is designed to increase students' skills in editing text through the use of computers is the EDIT Strategy (Hughes, Schumaker, McNaughton, Deshler, & Nolan, 2010). Hughes et al. (2010) developed the EDIT Strategy from their work concerning two previous learning strategies, the Error Monitoring Strategy (Schumaker, Nolan, & Deshler, 1985) and the InSPECT Strategy (McNaughton & Hughes, 1999). The EDIT Strategy was designed to aid students in finding and correcting grammatical errors within electronically written passages. Hughes et al. (2010) described an initial study conducted by Carranza and Hughes (2009) that investigated the efficacy of the EDIT Strategy with 22 fifth-, sixth-, and seventh-grade students. A pre- and posttest experimental design with random assignment to control and treatment groups was used. The EDIT Strategy was

taught to students in the treatment group in an explicit instruction format that incorporated the use of computers, electronic passages, spell checkers, along with the following components: (a) pretests; (b) teacher-led demonstration of the strategy with "think aloud" procedures; (c) verbal practice of the EDIT steps; (d) guided practice sessions with error correction and feedback; and (e) independent practice with feedback (Hughes et al., 2010). The steps in the EDIT Strategy mnemonic included: (1) Enter your first draft; (2) Do a spell check; (3) Interrogate yourself using the capitalization, overall appearance, punctuation, and spelling (COPS) questions, and (4) Type in corrections and run the spell-checker (Hughes et al., 2010).

After three weeks of instruction, students in the treatment group, mastered the strategy, and increased their average pretest scores of 28% of errors corrected to an average of 80% of errors corrected on the posttest. No significant differences were revealed on posttest performance between a sample of students without disabilities and students in the treatment group. Maintenance data indicated that students who were taught the EDIT strategy maintained their posttest skill levels several weeks after instruction ended.

The purpose of this study was to investigate the efficacy of the EDIT Strategy and evaluate the impact of the strategy on improving the editing skills of young adults with developmental disabilities enrolled in a postsecondary program. The following research questions were posed:

1. Will there be a significant difference in the overall EDIT score for the total number of editing errors corrected for students who received the EDIT Strategy instruction when compared to students who did not receive the intervention?
2. Will there be a significant difference in the specific types of editing errors corrected (i.e. spelling, capitalization, overall appearance, punctuation, and missing words) for students who received the EDIT Strategy instruction when compared to students who did not receive the intervention?
3. During the maintenance stage, will there be a significant difference in overall EDIT

scores and type of editing errors corrected for students who received the EDIT Strategy instruction when compared to students who did not receive the intervention?

Method

Participants

Originally 23 students agreed to participate in the study. However two students who performed at or above the designated mastery criterion of 80% on the EDIT pretest were not included in the study. In addition, two participants in the control group were absent during the posttest and were subsequently not included in the data analysis. Ultimately there were 19 participants included in the study with 11 students in the treatment group and eight students in the control group. All participants were young adults with developmental disabilities who were enrolled in a two-year postsecondary program located at a university in the Midwest. The participants' ages ranged from 20 to 23 years ($M = 21.16$, $SD = 1.12$). There were 5 (26.3%) females and 14 (73.7%) males. With regard to race, all of the participants were White. There were five (26.3%) individuals from urban areas, seven (36.8%) from suburban areas, and seven (36.8%) from rural areas. With regard to disability categories, two (10.5%) individuals were diagnosed with Asperger's Disorder, one (5.3%) with a non-verbal learning disorder, six (31.6%) with autism, eight (42.1%) with intellectual disabilities, one (5.3%) with an intellectual disability and cerebral palsy, and one (5.3%) with other health impairment and cerebral palsy. The participants' Woodcock Johnson Achievement III (WJIII; Woodcock, McGrew, & Mather, 2001) Total Scores (standard scores with a $M = 100$, $SD = 15$) ranged from 50 to 98, ($Mdn = 77$) while Broad Reading scores ranged from 58 to 92, ($Mdn = 78$). Participants' Broad Writing scores ranged from 48 to 100, ($Mdn = 76$).

A series of ANOVAs were conducted to explore the differences among the treatment and control groups' number of correct responses on the EDIT pretest. No significant differences $F(1, 18) = .131$, $p = .722$ between groups were found for overall pretest scores.

Analysis of variance (ANOVA) comparisons, *p*-values, and effect sizes for the treatment and control group pretests are depicted in Table 1.

Materials

Prior to administering the EDIT pretest prompts the Dynamic Indicators of Basic Literacy Skills Oral Reading Fluency (ORF) and Retell Fluency (DIBELS, Good & Kaminski, 2002) curriculum-based measures were administered to each of the study participants in order to determine the minimum ORF level and Retell Fluency among the participants. The minimum ORF level and Retell Fluency for the participants was determined to fall within the third grade level.

All of the EDIT pre- and posttest prompts, teaching materials, practice exercises, and maintenance prompts were adapted or constructed using a third grade reading level. The EDIT Strategy instructional manual (Hughes et al., 2010) served as the guide for developing each of the EDIT lessons. Each lesson was supplemented with the use of graphic organizers that contained the steps of the EDIT mnemonic. In addition, at the beginning of each lesson, students were each given a computer memory stick, a student folder with a self-monitoring graph, a visual mnemonic with each of the EDIT steps, and cue sheets for respective lessons. The class was conducted in a computer lab. Each student had a PC desktop computer. The instructor used a projector, document camera, and PC desktop computer located in the front of the room to present material to the class.

The two EDIT pre- and posttest prompts were adapted from the student EDIT passages provided within the EDIT Strategy manual (Hughes et al., 2010) to fall within a third grade reading level according to the Flesh-Kincaid Readability score. Prompt A was entitled "Giant Panda" and pertained to the habits and environment of Giant Pandas. This prompt contained three paragraphs with a total word count of 221. Prompt B was entitled "California Redwood" and consisted of a description of the California Redwood forests. Prompt B contained three paragraphs and consisted of 222 words. Prompt A and Prompt B, each contained 25 errors.

Each EDIT prompt contained spelling, capitalization, overall appearance, punctuation, and substance (i.e. missing words) errors. Total scores for each of the respective error types (i.e., spelling, capitalization, overall appearance, punctuation, and substance) could range from 0 to 5. There were five spelling errors that consisted of one contextual spelling error (i.e., defined as a word that is spelled correctly yet used incorrectly such as a homophone) and four incorrectly spelled words within each EDIT prompt. There were five capitalization errors (e.g., proper nouns, beginning of sentences). There were five Overall Appearance errors (e.g., errors in indenting paragraphs, errors in spaces between sentences, errors in spacing between paragraphs) and five punctuation errors (e.g. commas, periods, exclamation marks, and question marks). The final category was Substance (i.e. missing words) which included five errors which pertained to missing words within sentences (e.g. a, an, the, subject of a sentence).

The maintenance prompt was adapted from the teacher material provided in the EDIT Strategy instructional manual. Adaptations included revising the prompt so it fell within the third grade reading level. The topic of the maintenance prompt pertained to purchasing a vehicle and weighing the pros and cons of different types of vehicles. The number and type of errors were designed to emulate the pre- and posttests prompts and included 25 errors. There were five of each of the following errors: spelling, capitalization, overall appearance, punctuation, and substance (i.e. missing words). The prompt consisted of 211 words.

Design and Procedure

Design. A 2-level (treatment or control) single factor, pre- and posttest experimental design was employed. Students were randomly assigned to a treatment or control group. There were 21 participants each assigned a number from a random number chart. The students were assigned to the treatment or control groups based upon whether an odd number or even number had been assigned (i.e., odd number = treatment group; even number = control group). There were 11 students in the treatment group and ten students

Table 1

EDIT Pre- and Posttest Scores and Maintenance Scores 11 Weeks Following Posttests for the Treatment and Control Groups

Test	EDIT Total	Spelling	Capitalization	Overall App	Punctuation	Substance
Pretest						
T group (11)	8.77* (4.14)	2.00* (1.26)	4.27* (0.90)	1.18* (0.98)	1.00* (1.61)	0.63* (1.19)
C group (8)	9.50* (4.57)	2.50* (1.51)	3.88* (1.64)	1.38* (1.19)	1.13* (1.13)	0.32* (0.64)
ES	0.17	0.36	0.31	0.18	0.10	0.34
ANOVA	$F(1,18) = .131$ $p = .722^{ns}$	$F(1,18) = .615$ $p = .444^{ns}$	$F(1,18) = .460$ $p = .507^{ns}$	$F(1,18) = .151$ $p = .703^{ns}$	$F(1,18) = .035$ $p = .853^{ns}$	$F(1,18) = .529$ $p = .477^{ns}$
Posttest						
T group (11)	17.09* (4.04)	3.00* (1.10)	4.82* (0.40)	3.36* (1.50)	3.64* (1.21)	2.27* (1.85)
C group (8)	10.50* (5.84)	2.75* (1.28)	4.06* (1.70)	1.94* (1.15)	1.25* (1.83)	0.50* (1.41)
ES	1.01	0.21	0.62	1.06	1.54	1.08
ANCOVA	$F(1, 17) = 8.157$ $p = .011^{**}$	$F(1, 17) = .064$ $p = .803^{ns}$	$F(1, 17) = 1.776$ $p = .201^{ns}$	$F(1, 17) = 4.604$ $p = .048^{**}$	$F(1, 17) = 11.225$ $p = .004^{**}$	$F(1, 17) = 4.373$ $p = .053^{ns}$
Main. 11 wks						
T group (9)	16.06* (3.68)	4.00 * (0.00)	3.11* (0.33)	3.94* (0.88)	2.89* (1.69)	2.11* (1.97)
C group (8)	10.56* (5.59)	3.38* (1.06)	2.88* (1.36)	1.94* (1.52)	1.75* (1.98)	0.63* (1.06)
ES	1.19	1.06	0.27	1.67	0.62	0.98
ANOVA	$F(1, 15) = 5.863$ $p = .029^{**}$	$F(1, 15) = 3.151$ $p = .096^{ns}$	$F(1, 15) = .257$ $p = .619^{ns}$	$F(1, 15) = 11.403$ $p = .004^{**}$	$F(1, 15) = 1.635$ $p = .220^{ns}$	$F(1, 15) = 3.620$ $p = .076^{ns}$

Note. * Denotes mean values, T group (#) = number of treatment group participants, C group (#) = number of control group participants. Standard deviations are provided in parentheses. Overall App = Overall Appearance. ^{ns}= non-significant. ES = Effect size, Cohen's *d*. Main. 11 wks = Maintenance 11 weeks.

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in the control group. A pretest was given to all the participants two weeks before the EDIT intervention began. In order to control for difficulty levels across the pre and posttest prompts, they were counterbalanced. For the pretest, Prompt A and B were randomly assigned to the students. For the posttest, students who responded to Prompt A in the pretest were administered Prompt B. Subsequently, students who responded to Prompt B in the pretest were given Prompt A for their posttest.

Each student took the pre- and posttests in a large group format, on a PC that had either Prompt A or Prompt B loaded in the form of a Microsoft Word 2010 document. Prior to the pretest, posttest, and maintenance test the instructor told the students "We have placed a word document on your computer. When I tell you please click on the document to open it. You will have 30 minutes to read the document and then run the spell checker and correct any errors you find" (adapted from Hughes et al., 2010).

Students who did not meet the established exclusion criterion of 80% correct on the pretests were included in the study. As a result of this criterion, two students were not included in the study. Two students in the control group were absent from the posttests and were not included in the data analysis. For the pre- and posttests analyses there were 11 students in the treatment group and eight in the control group.

Intervention. The EDIT intervention was administered in sixteen, 50 min sessions. Students were taught the intervention two times a week on Tuesdays and Thursdays for eight consecutive weeks. The collective instructional time for the administration of the intervention was approximately 13.3 hrs. The EDIT strategy was taught during a regularly scheduled time for the duration of the semester where students were to receive instruction in editing strategies. A group setting was employed to deliver the EDIT instruction. The instructor was a doctoral candidate in special education and held a Master's degree in special education. The instructor met with the first author before each respective lesson was delivered in order to review the EDIT manual, lesson plans, and materials.

Students were taught the EDIT strategy

through the use of the EDIT mnemonic and a sequence of explicit instruction lessons. The EDIT mnemonic is depicted in Figure 1. In addition, the EDIT strategy steps and a summary of each lesson are shown in Table 2. The instructor taught the EDIT strategy to the treatment group over the course of 16 sessions. Within the EDIT strategy manual each lesson was structured in an explicit instruction format that was executed through the use of a detailed teacher scripts. Each lesson contained an advance organizer that delineated what material had been covered in the previous lessons, what material was going to be covered in the present lesson, and teacher expectations for the students (e.g., pay attention, take notes).

Throughout each lesson the instructor modeled the skills to be taught and subsequently led the students through practicing the skills using "think aloud" procedures. Next, through guided practice students rehearsed the skills and received immediate feedback. Students would then complete an independent mastery exercise. The instructor scored the independent exercise, provided students feedback, and had students record their score on a graph attached inside their folders. The criterion for mastery for each independent exercise was 80%. An example of an independent passage scoring key is provided in Figure 2.

Within each lesson a graphic organizer was employed that depicted the EDIT strategy steps that were going to be presented in the lesson and the steps that had been presented in previous lessons. Supports within each EDIT lesson included the visual EDIT mnemonic that was attached to the front of the students' folders. Each student was also given the EDIT mnemonic in a graphic organizer that included places where the students could check off each step of the strategy as they were completed. The EDIT mnemonic graphic organizer is depicted in Figure 1.

At the beginning of each lesson students uploaded three files to their desktops (i.e., model passage, guided practice passage, and an independent passage). The instructor then led the students in a large group format through each of the EDIT steps that had been previously taught and proceeded to model the respective new step. The EDIT Strategy man-

□ **E**nter Your First Draft

□ **D**o a SPELL Check. Put cursor at beginning

    □ Read the sentence with the error out loud

    □ <u>**S**elect the correct option</u>

       * <u>If you don't see the correct option</u>

       □ 1. Say the word aloud.
       □ 2. Add any letters that you hear.
       □ 3. Run the spellchecker on the word.
       □ 4. If you see the correct option, select it.

□ **P**ass over the document

□ **E**xpress each sentence

□ **L**ook for homophone errors

□ **L**ook for typos

□ **I**nterrogate yourself Use the COPS Questions

    □ Put the cursor at the end of the document

□ **C**apitalization questions
    □ Look at the beginning of sentences
    □ Proper Nouns (people, places, and things)

□ **O**verall appearance questions
    □ Look at paragraph indention
    □ Spacing between sentences

□ **P**unctuation questions
    □ Is there punctuation at the end of the sentence?
    □ Is it correct?

□ **S**ubstance questions
    □ Read the sentence out loud.
    □ Is the sentence missing any words.
    □ Does it make sense?

□ **T**ype in corrections and run spellchecker

Figure 1. EDIT Graphic Organizer.

ual provided teacher and student passages for each lesson via a compact disc. Passages were adapted so that they fell within the third grade reading level. In addition, original third grade passages were created. The original passages were adapted to include approximately 25 to 30 errors and to address the previously taught and current skills to be covered in each lesson.

The types of errors (e.g., spelling, capitalization, punctuation, overall appearance, and substance/missing words) included within the model passage, guided practice passage, and independent passage for each lesson were dependent upon the previously taught and target skills to be introduced for each respective lesson. Spelling errors targeted within the passages included misspelled words in which the spell checker would give the student the correct option within the first or second word choice, contextual spelling errors (i.e., homo-

phones), and spelling errors in which the student had to add letters to the misspelled word then run the spell checker to generate the correct word choice. Capitalization errors included errors in words at the beginning of sentences and proper nouns within the passages.

Punctuation errors within the passages included errors at the end of sentences and the misuse of commas within passages. Overall appearance errors within passages included paragraphs that were not indented or that were indented too far (e.g., 10 spaces), two paragraphs that had too many spaces between each other, and words within sentences or between sentences that had too much space or not enough space between them. Substance errors within passages included missing words within sentences such as a noun, pronoun, or an article (i.e., a, an, the). The

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Table 2

Implemented EDIT Strategy Lessons (adapted from Hughes et al., 2010).

Lesson	Sessions	Lesson Activities
1	1	The instructor led a discussion with students and identified the current strategies used when editing documents. The utility of the EDIT strategy was discussed and the EDIT mnemonic was introduced. The students committed to learning the EDIT strategy.
2	7	Through teacher modeling and guided practice students completed step 1, "Examine your first draft." They opened and examined an electronic passage. In the next step "Do a SPELL Check" students placed the cursor at the beginning of the document and started the spell checker. When an error was found the students read the sentence that contained the error and looked at the spell checker options. If the correct option was not provided, students said the word out loud, added letters that were needed, ran the spell checker, and selected the correct option. If the correct option was not found the students were instructed to use a word with the same meaning.
3	3	Students reviewed and completed the previous EDIT steps (i.e., examine your first draft, do SPELL Check). The instructor modeled and led the students through guided practice and thinking out loud through each of the COPS Questions (i.e., Were there any capitalization, overall appearance, punctuation, or substance errors)? The students performed the last EDIT step "T" by correcting typos and running the spell checker again.
4	1	The instructor led a discussion with the students to evaluate their understanding (e.g., rationale for applying the EDIT steps) and ability to recall the EDIT strategy steps. Students completed a verbal practice session as a group and one to one with the instructor and recited the EDIT steps with the rationale for applying each step.
5	4	The instructor led a discussion with the students where they stated how and why they would apply each of the SPELL and COPS steps when editing an electronic passage. Next, the students were given a guided practice electronic passage and were instructed to apply all of the EDIT strategy steps. The students were provided with immediate feedback. Next the students completed an independent exercise where they applied the EDIT strategy steps to an electronic passage. The students recorded and graphed their score.

length of each passage ranged from approximately 198 to 240 words and consisted of three to four paragraphs. Examples of EDIT passages used within lessons three through four included topics such as favorite pets, desirable vacation destinations, and several stories about visiting a farm.

The first author and a doctoral student collected treatment integrity data for each lesson.

A treatment integrity sheet was constructed for each lesson. The treatment integrity sheet delineated the instructional components (e.g., advance organizer, instructor expectations, EDIT steps to be taught) of each respec-

tive lesson. Both raters observed the instructor and subsequently checked off each instructional step that was completed. If steps were not completed then they were not checked off.

Control group intervention. Students in the control group participated in a science class during the intervention time. Outside of the time spent in editing and science instruction, students in the treatment and control groups attended their regularly scheduled classes and participated in their other respective coursework (e.g., career development, money management).

Gulf Shores **is(M)** a fun vacation spot. It is located in **alabama(C)**. Gulf Shores has pure white beaches and **cler(S)** blue ocean waters. It is one of the most popular vacation places in the state of **Alabama(P)** Many people visit this area **eah(S)** year. Gulf Shores became famous during a big oil spill a few years ago**?(P)** An oil drill off **the(M)** coast of **gulf(C)** Shores blew up. Oil began **to(M)** be spilled in the ocean. The oil spilled into the ocean for three months. The ocean water was black with **oil(P)**

(O)

Many people tried to fix the oil **leak(O)**Everyone in the United States watched the oil spill on the news. The **beaes(S)** in Gulf **shores(C)** began to be covered in black oil. The people of Gulf Shores were very worried about **the(M)** ocean and the sea animals.   **(O) Lots** of people tried to **help(P)**

(O) The oil leak was finally fixed after three long months. **the(C)** people of Gulf Shores were very happy. Now they began to try and clean up all of the oil. Many **pele(S)** around the word came to help the people of Gulf **Shores.(O)**The people worked very hard **to(M)** clean up the oil. **today(C)** when you visit Gulf Shores you will **sea(H)** white pretty beaches again**(P)**

Errors	Spelling ✓		Capitalization	Overall Appearance	Punctuation	Substance Missing Word
25	4	1 Homophone	5	5	5	5
Errors Corrected						
Errors Not Corrected						

_____ correct out of 25 = _____ %   _____total errors

Figure 2. Lesson 3 Independent Passage EDIT Scoring Key.

Dependent variable. The pre- and posttest EDIT prompt responses were scored using the two respective EDIT scoring keys. The EDIT scoring keys (i.e., Prompt A scoring key and Prompt B scoring key) provided a guide for determining if students had corrected the 25 errors contained in each EDIT prompt. Each EDIT scoring key yielded a total score that consisted of the sum of all the editing errors that were corrected. Scores could range from 0 to 25 for the total score. In addition, each EDIT scoring key provided the sum of the errors that were corrected for five categories. The following five editing areas were addressed: spelling, capitalization, overall appearance, punctuation, and substance (i.e. missing words). Possible scores for each of the five editing areas could range from 0 to 5.

Data collection. The pretest EDIT prompts were administered to all students in a group format two weeks before the EDIT strategy was implemented. One week following the completion of the EDIT strategy instruction, the EDIT posttest prompts were administered. A maintenance test was administered to all the participants 11 weeks following the conclusion of instruction. The pre- and posttest responses and maintenance tests were scored by two education doctoral students who had previous experience in scoring and evaluating assessments. Each rater was provided with two EDIT scoring keys for EDIT Prompt A and EDIT Prompt B. The raters had no knowledge as to whether the EDIT prompt responses they were scoring belonged to the treatment or control groups. The raters met with the first author who reviewed the six scoring components (i.e., total score, spelling, capitalization, punctuation, overall appearance, and substance) of each of the EDIT scoring keys. The raters then practiced scoring sample EDIT prompt responses.

Data Analysis

The data were analyzed using SPSS 11.0 (2002). A series of ANOVAs and analysis of covariance (ANCOVAs) were conducted to examine the differences between the treatment and control groups' pre- and posttests and maintenance EDIT responses. Cohen's d effect sizes were examined in order to discern the strength of statistically significant findings

with $< .2$ as small, $< .5$ as medium, and $> .8$ as large (Cohen, 1988).

Results

Treatment Integrity and Inter-Rater Reliability

During each lesson treatment integrity checklists were completed by two raters. Each checklist included all the steps for each of the respective EDIT lessons. The overall treatment integrity across all of the EDIT checklist ratings over the course of sixteen, 50 min lessons was 100%. The treatment integrity rater agreement was 100%. The results from the EDIT pre- and posttest scores and maintenance probes were determined by the averages of the two raters' scores on the EDIT scoring keys. In order to determine inter-rater reliability, the individual raters' scores were compared and yielded correlations that ranged from 1.00 to .97 (*Mdn* = 97) across all areas (i.e., the total EDIT score and each of the five editing error types).

EDIT scoring key. The differences between the treatment and control groups' posttests were examined via a series of ANCOVAs using the students' pretests as the covariate. The raters' average EDIT scoring key posttest scores for the treatment and control groups yielded significant results in favor of the treatment group $F(1, 17) = 8.157, p = .011$ with a large effect size $d = 1.01$.

In order to further investigate the source of the overall significance between the treatment and control groups' posttest responses the average of the raters for each of the five types of editing errors (i.e., spelling, capitalization, overall appearance, punctuation, and substance) delineated in the EDIT scoring keys were examined. A significant difference was revealed in favor of the treatment group for the Overall Appearance total score, $p = .048$, with a large effect size $d = 1.06$ and for the Punctuation total score, $p = .004$, with a large effect size $d = 1.54$. While the Substance (i.e. missing words) total score was not determined to be significant, $p = .053$, a large effect size $d = 1.08$ was revealed. A non-significant difference was found for the Spelling total score, $p = .803$, with a small effect size $d = 0.21$ and for the Capitalization total score, $p = .201$, with a medium effect size $d = 0.62$. The mean

values, standard deviations, p values, effect sizes, and ANOVA results for the overall EDIT scoring key total score and for the respective five types of editing error total scores are depicted in Table 1.

Maintenance. Eleven weeks after the EDIT intervention had concluded 17 ($n = 8$, control group; $n = 9$, treatment group) participants were given an EDIT maintenance prompt in a large group setting. Two students in the treatment group were absent and due to time constraints and the students' schedules we were not able to administer the maintenance prompt to these students. The EDIT strategy was not reviewed. The average of the raters' EDIT scoring key total scores and individual area scores were compared for the treatment and control groups.

The overall total score was significant in favor of the treatment group $F(1, 15) = 5.863$, $p = .029$, and yielded a large effect size, $d = 1.19$. The average EDIT scoring key scores for the individual areas of spelling, capitalization, overall appearance, punctuation, and substance were also examined. A significant difference was found in the area of overall appearance, $F(1, 15) = 11.403$, $p = .004$, with a large effect size, $d = 1.67$ in favor of the treatment group. The individual areas of spelling, capitalization, punctuation, and substance were determined to be not significant when the treatment and control groups' scores were compared. The mean values, standard deviations, p values, effect sizes, and ANOVA results are depicted in Table 1.

Discussion

This was the first investigation of the EDIT Strategy (Hughes et al., 2010) within a postsecondary setting with young adults with developmental disabilities. The results of the study revealed that students who were taught the EDIT Strategy were able to learn and apply the multi-step strategy to identify and correct errors within an electronic word document. Students who were taught the EDIT Strategy corrected a significantly higher number of errors on the posttests when compared to the control group. When the pre- and posttest performances were compared within each group, students in the treatment group corrected an average of 35.1% of the errors on

the pretest and 68.4 % of the errors on the posttest, while the control group corrected an average of 38% of the pretest errors and 42% of the posttest errors.

With regard to the types of editing errors corrected in the posttests, a significant difference was found in favor of the treatment group who identified and corrected 28.4% more overall appearance errors and 47.8% more punctuation errors than the control group. While no significant differences were found, a further examination of the posttest data revealed that the treatment group corrected 35% more substance errors, 5% more spelling errors, and 15% more capitalization errors than the students who were not taught the intervention. In addition, students in the treatment group significantly outperformed the control group in the total number of editing errors and the overall appearance errors corrected in the maintenance test administered 11 weeks after the intervention had ended.

Results of this study were compared to the Carranza and Hughes' (2009) previous investigation of the EDIT Strategy with elementary and middle school students with learning disabilities. Carranza and Hughes found that following three weeks of instruction, students who learned the EDIT strategy increased their average pretest scores of 28% of errors corrected within an electronic passage to an average of 80% of errors corrected within an electronic passage on the posttest. The students who participated in this current study were young adults with developmental disabilities such as intellectual disabilities, Asperger's syndrome, and autism with varying ranges of academic performance. Over a period of eight weeks the students who learned the strategy were able to correct editing errors within an electronic word document. These students corrected an average of 35.1% of the errors on the pretest and 68.4 % of the errors on the posttest. In both of the studies, students that were taught the EDIT Strategy were able to successfully correct a significantly higher number of errors on their posttests when compared to the number of errors corrected on the pretests.

Cochran-Smith (1991) asserted that intraindividual factors can affect one's ability to effectively complete one or all of the iterative

phases of writing (e.g., pre-planning, constructing text and revising text) via word processing. The authors identified the following intra-individual factors: (a) prerequisite skills in constructing text and revising; (b) previous computer experience (e.g., keyboarding, using editing functions); and (c) pre-existing strategies used in the writing process as variables that can affect the quality of an individual's writing (Cochran-Smith, 1991).

The students with developmental disabilities who were taught the EDIT Strategy exhibited many of the intra-individual factors noted by Cochran-Smith (1991). Students entered instruction with a wide variety of skill sets with regard to computer use. Some students had previous experience loading, labeling, and saving electronic files from a memory stick while others did not. With regard to typing, skills varied within the group with some students using two fingers to type while others exhibited greater typing skill. While some students were able to access the spell checker function in Microsoft Word without help other students needed modeling and guided practice to acquire this skill.

All of the students required explicit modeling and guided practice in how to employ the SPELL steps of the strategy especially in the identification of homophones and in the process of correcting spelling errors by adding letters and running the spell checker again to generate the correct word choice. With regard to the COPS steps, students often would skip sentences during their "interrogation process" when they asked themselves the COPS questions for each sentence. Support was provided through guided practice and the use of graphic organizers where the students checked off the COPS steps as they were completed. Despite the differences in intra-individual factors exhibited by the students, each student was able to learn the EDIT Strategy steps.

Limitations and Future Research

There were several limitations with regard to this study. First, while students who were taught the EDIT Strategy corrected significantly more posttest total errors, a significant difference was found for only two (i.e., overall appearance, punctuation) out of the five error

types corrected. Following 11 weeks of instruction once again the students who received the editing intervention corrected a significantly higher number of total errors, however only one (i.e., overall appearance) out of five error types yielded a significant difference when compared to the control group. Due to the fact that the pretest, posttest, and maintenance tests were designed with only five errors per each of the five error types (i.e., capitalization, spelling, overall appearance, punctuation, and substance) there could have been a ceiling effect. Therefore individuals were only given a narrow range in which to perform. Future dependent measures could consist of a series of paragraphs with more editing errors (i.e., capitalization, spelling, overall appearance, punctuation, and substance) in which students would have the opportunity to identify and correct a greater number of editing errors.

The second limitation concerned the fact that students' skills in correcting editing errors were only appraised through passages provided by the instructor. Due to time constraints, students did not generate their own passages and correct errors within their own work. It is important that future studies examine if students can generalize their editing skills with their own written products.

Implications for Practice

Individuals who possess competent writing and computer skills can effectively utilize components of word processing (e.g., revising and editing via grammatical and spelling functions; adding substance to text; and improving the overall appearance of text) while writers that struggle with the basic components of writing and who have limited computer skills do not produce written products of equal quality (Cochran-Smith, 1991). It is imperative that individuals with disabilities who continue to experience difficulty in editing their written text beyond their K-12 schooling be provided with strategy instruction.

Findings from this study indicated that young adults with developmental disabilities were able to acquire and apply the EDIT Strategy within a postsecondary setting. Given the impact that one's skill in written expression has across one's lifetime it is essential to iden-

tify and investigate the efficacy of proofreading and revising strategies. While further investigation is needed the EDIT Strategy holds promise as an effective instructional tool for young adults with developmental disabilities.

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